

# Technology Technical Note MO-1

## Utilizing a Garmin GPSmap 76 for Field Data Collection in Missouri



<u>Table of Contents</u>	Page
<b>Introduction .....</b>	<b>1</b>
<b>Required Software .....</b>	<b>1</b>
<b>Equipment.....</b>	<b>1</b>
<b>Overview of the Garmin GPSmap 76.....</b>	<b>2</b>
<i>Layout of the Garmin GPSmap 76.....</i>	<i>2</i>
Button descriptions .....	2
<i>Tips on using Garmin keypad .....</i>	<i>3</i>
<i>Screens.....</i>	<i>4</i>
<b>Garmin GPSmap 76 Setup.....</b>	<b>6</b>
<b>Loading Background Maps into Garmin.....</b>	<b>10</b>
<b>Collecting GPS Data in the Field .....</b>	<b>13</b>
<i>Waypoints vs. Tracks.....</i>	<i>13</i>
<i>Required Accuracy Levels.....</i>	<i>14</i>
Using GPS to Certify Conservation Practices .....	14
Using GPS for Conservation Planning .....	14
<i>Collecting GPS Data as Waypoints.....</i>	<i>15</i>
Averaging .....	15
Deleting Points .....	16
<i>Collecting GPS Data as Tracks .....</i>	<i>17</i>
Calculating Area .....	18
Clearing the Track Log .....	18
<b>Using GPS Data.....</b>	<b>19</b>
<i>Garmin GPSmap76 Setup for Downloading.....</i>	<i>19</i>
<i>DNR Garmin Setup .....</i>	<i>20</i>
<i>Downloading GPS Data.....</i>	<i>22</i>
<i>Editing GPS Data .....</i>	<i>23</i>
<i>Working with Waypoint Data Using DNR Garmin.....</i>	<i>23</i>
Editing the Waypoint Data.....	23
Saving the Waypoints as an ArcView shapefile .....	24
Using DNR Garmin to Convert Waypoints to Lines or Polygons .....	25
<i>Working with Track Data Using DNR Garmin.....</i>	<i>28</i>
Editing the Track Data.....	28
Saving the Tracks as an ArcView shapefile .....	29
<i>Uploading ArcView Data to the GPS Using DNR Garmin.....</i>	<i>31</i>
Uploading Waypoints .....	31
Uploading Tracks.....	32
<i>Navigating with the Garmin GPSmap 76 .....</i>	<i>34</i>
Navigating to a Point .....	34

**Appendix A – Field Guides.....37**  
    **“Complete SETUP” Field Guide ..... 37**  
    **“Interface SETUP for Backpack Use” Field Guide..... 38**  
    **“Marking Points” Field Guide..... 39**  
    **“Deleting/Navigating to Points” Field Guide..... 40**  
    **“Starting/Stopping Track Logs” Field Guide ..... 41**  
    **“Calculate Area/Clear Track Log” Field Guide..... 42**

**Appendix B – DNR Garmin with ArcMap .....43**  
    **Standalone DNR Garmin Setup ..... 43**  
    **Downloading & Editing GPS Data ..... 43**  
    **Working with Waypoint Data Using Standalone DNR Garmin..... 44**  
        Saving the Waypoints as an ArcView shapefile ..... 44  
        Converting Waypoints to Lines or Polygons ..... 45  
    **Working with Track Data Using Standalone DNR Garmin ..... 46**  
        Saving the Tracks as an ArcView shapefile ..... 46  
    **Adding a Shapefile to ArcMap..... 47**  
    **Saving a Shapefile from ArcMap..... 48**  
    **Uploading ArcMap Data to the GPS Using DNR Garmin..... 50**  
        Uploading Waypoints & Tracks ..... 50

## **Introduction**

The intent of this document is to provide instructions for utilizing a Garmin GPSmap 76 for field data collection. The instructions include:

- An overview of the Garmin GPSmap 76.
- Setting up the Garmin so that data collected in the field matches current NRCS GIS layers.
- Setting up the Garmin for use with the differential GPS (DGPS) Beacon Receiver.
- Loading background maps into the Garmin.
- Collecting data with the Garmin.
- Required accuracy levels.
- Using the MN DNR Garmin software to download data from the Garmin into ArcView/ArcGIS and to upload ArcView/ArcGIS data into the Garmin for use in the field.
- Navigating with the Garmin GPSmap 76.

## **Required Software**

In order to use the procedures contained in this document, the following software is needed:

- MapSource
- ArcView (or ArcMap 8.3)
- MN DNR Garmin GPS interface software.

**NOTE:** The mention and/or use of any software contained in this document should not in any way be considered as an endorsement by USDA-NRCS.

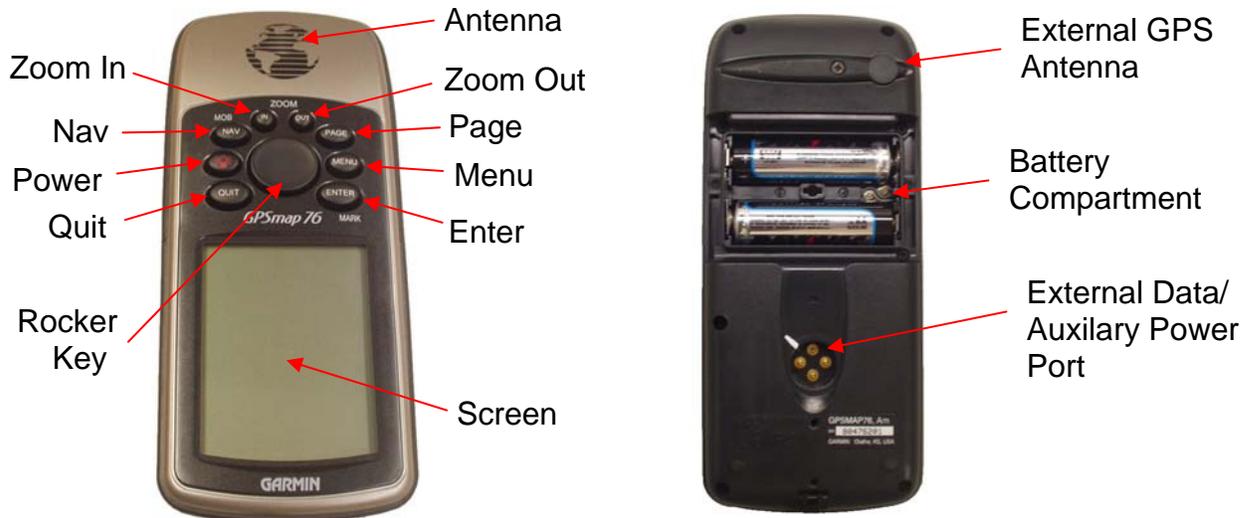
## **Equipment**

This document assumes the equipment being used is that found in the USDA Configuration I GPS system. This includes a Garmin GPSmap 76 receiver, a radio beacon receiver, a dual GPS/beacon antenna, a rechargeable external battery, backpack, and all the necessary cables. This equipment provides real-time differential GPS capability. This simply means that a correction from an external source at a known location (e.g., US Coast Guard radio beacon site) can be received and applied to the satellite information your GPS unit is receiving to obtain a more accurate location.

## Overview of the Garmin GPSmap 76

This section gives a brief overview of the unit and how to use the basic features. For more details, users should read the **Garmin GPSmap 76 Owner's Manual and Reference Guide**.

### ***Layout of the Garmin GPSmap 76***



### **Button descriptions**

- Power Key:** The **POWER** key is used to turn the unit on and off. Press and hold the Power key to turn on or off the GPS
- Rocker Key:** The **ROCKER** key is used to control the movement of the cursor on menus and map displays.
- Page Key:** The **PAGE** key is used to navigate forward through the 5 main display pages. The Page key will also end an operation in progress and return to one of the main pages.
- Quit Key:** The **QUIT** key is used to navigate backward through the 5 main display pages. The Quit key will also end an operation in progress and return to one of the main pages.
- Menu Key:** The **MENU** key will display the page options menu for the current page. Pressing the Menu key twice will display the main options menu.
- Enter Key:** The **ENTER** key is used to activate a data field or make a menu selection. Pressing and holding the Enter key will allow the user to capture the current position as a waypoint.
- Nav Key:** The **NAV** key is used to start or end navigation functions. Holding down the **NAV** key will store the current position and gives you the opportunity to begin navigating back to that marked point.
- Zoom In and Zoom Out Keys:** These keys allow you to view a smaller area of the displayed map in greater detail (**ZOOM IN**) or a larger area in less detail (**ZOOM OUT**).

### ***Tips on using Garmin keypad***

The following tips should be helpful in selecting and entering items on the screens using the keys on the Garmin keypad.

Use the **ROCKER** key to highlight (i.e., move to) the desired field by pressing on the side of the key in the direction you wish to move.

For a list field (e.g., Symbol field on the “Mark Waypoint” screen),

- a) Press **ENTER** to change to selection mode.
- b) Use **ROCKER** key to highlight the desired item from the list.
- c) Press **ENTER** to select item.

For a data entry field (e.g., Waypoint number field on the “Mark Waypoint” screen),

- a) Press **ENTER** to change to edit mode. The first character will be highlighted.
- b) Use top/bottom of **ROCKER** key to scroll up/down through available numbers and/or letters.
- c) Use right side of **ROCKER** key to move to next character.
- d) Repeat steps b and c as needed.
- e) Press **ENTER** to accept changes or **QUIT** to cancel changes.

For a search list field (e.g., Waypoint name field on the “Waypoint by Names” screen),

- a) Use top/bottom of **ROCKER** key to scroll up/down through available numbers and/or letters in highlighted character position.
- b) Use right side of **ROCKER** key to move to next character.
- c) Repeat steps a and b as needed.
- d) Press **ENTER** to drop into list.
- e) Use top/bottom of **ROCKER** key to scroll up/down through list.
- f) Press **ENTER** to select the highlighted item.



**Screens (cont.)**

**Pointer Page**

SPEED: 0.0<sup>m</sup>/<sub>h</sub>    DIST TO NEXT: 0.67<sup>m</sup>/<sub>i</sub>  
**Adamson Gallery**

Vertical line shows direction of travel

Pointer direction to point to which you are navigating

Compass Ring (not a true compass, must be moving to get a true reading)

**Highway Page**

(This page is best used for straight line navigation)

SPEED: 0.0<sup>m</sup>/<sub>h</sub>    DIST TO NEXT: 0.67<sup>m</sup>/<sub>i</sub>  
 COURSE: 040<sup>°</sup><sub>T</sub>    OFF COURSE: 0.00<sup>ft</sup>  
**Adamson Gallery**

Position icon – black arrowhead (keep this on the white line of the road)

Numbers to aid in navigation

**Active Route Page**

**Active Route**

Route name: **ADMSNG-THMSJF**

Waypoint	Distance
Adamson Ga	---
Washington	0.30 <sup>m</sup>
Lincoln Mem	1.11 <sup>m</sup>
Thomas Jef	2.04 <sup>m</sup>
-----	---
<b>Total</b>	<b>2.04<sup>m</sup></b>

Distances for each leg of the route

Total distance

## Garmin GPSmap 76 Setup

The following procedure should be used to set up a Garmin GPSmap 76 receiver to insure that data collected in the field is consistent with GIS data and imagery currently available to USDA Service Centers.

1. To use the GPS unit with the backpack, do the following:

- a. Connect the thin gray antenna cable from the “GPS Out” port on the beacon receiver to the external antenna port on the top of the Garmin. This improves satellite reception over using the internal antenna of the Garmin unit.
- b. Connect the gray cable with the 4-pin Garmin connector from the “quadcomm” cable to the data/power port on the back of the Garmin. This powers the unit as well as relays the DGPS signal.
- c. Connect the red cable with the male cigarette lighter adapter end from the “quadcomm” cable to the female cigarette lighter adapter end of the battery. This will power up the beacon receiver as well as provide power to the GPS unit.

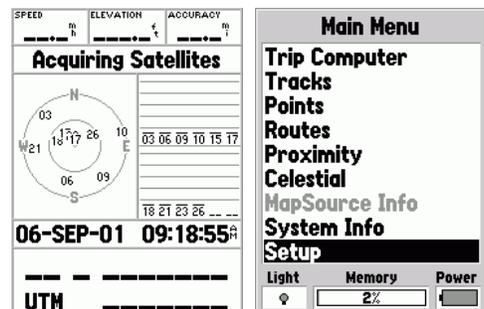


2. Turn on GPS unit by holding down **POWER** key until unit comes on.

3. Press the **ENTER** key until the GPS Information screen appears.

4. Press the **MENU** key twice to bring up the Main Menu.

5. Highlight “Setup” using the **ROCKER** key. Press the **ENTER** key to select.



## Technology Technical Note MO-1

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6. The Setup page has a number of tabs

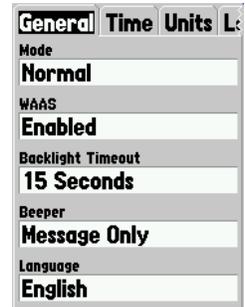
(*General, Time, Units, Location, Alarms, and Interface*)

Use the following procedure to change the setup values to those specified below for each tab.

- a. Use **ROCKER** key to move left or right to the desired tab.
- b. Use **ROCKER** key to move to desired field. Press **ENTER**.
- c. Use **ROCKER** key to select the correct setting. Press **ENTER**.

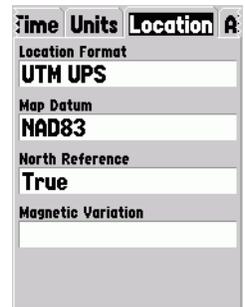
7. *General* tab.

- a. WAAS should be "**Enabled**" as shown at right. This will allow for greater accuracy if used without the DGPS beacon receiver. WAAS is used only when the interface is set to "Garmin" (i.e., not when it is set to "RCTM In/NMEA Out").



8. *Location* tab.

- a. Set *Location Format* to "**UTM UPS**".  
*Note: "Location format" simply determines the coordinate display on this unit. Data is still downloaded as latitude/longitude values into the MN DNR Garmin software.*
- b. Set *Map Datum* to "**NAD83**".
- c. Set *North Reference* to "**True**".



9. *Interface* tab.

**NOTE: The preferred method of collecting data with the Garmin is to use it with the DGPS Beacon Receiver in the backpack.**

a. Use Without the DGPS Beacon Receiver

The Garmin GPSmap 76 can be used without attaching the GPS to the DGPS beacon receiver in instances where maximum accuracy is not a requirement. Such instances might include conducting resource inventories, conservation planning, navigation, etc.

To operate without the beacon receiver, set *Serial Data Format* to **“GARMIN”**.

*Note: This setting is also used when downloading data to a computer.*



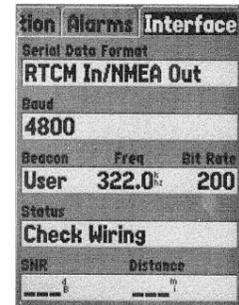
b. Use With the DGPS Beacon Receiver

The Garmin GPSmap 76 must be used with the DGPS beacon receiver in instances where maximum accuracy is required. Such instances include certifying conservation practices for payment, precise layout of conservation practices in the field, precise navigation, etc.

When using the beacon receiver, set *Serial Data Format* to **“RTCM In/NMEA Out”**  
*Baud* to **“4800”**

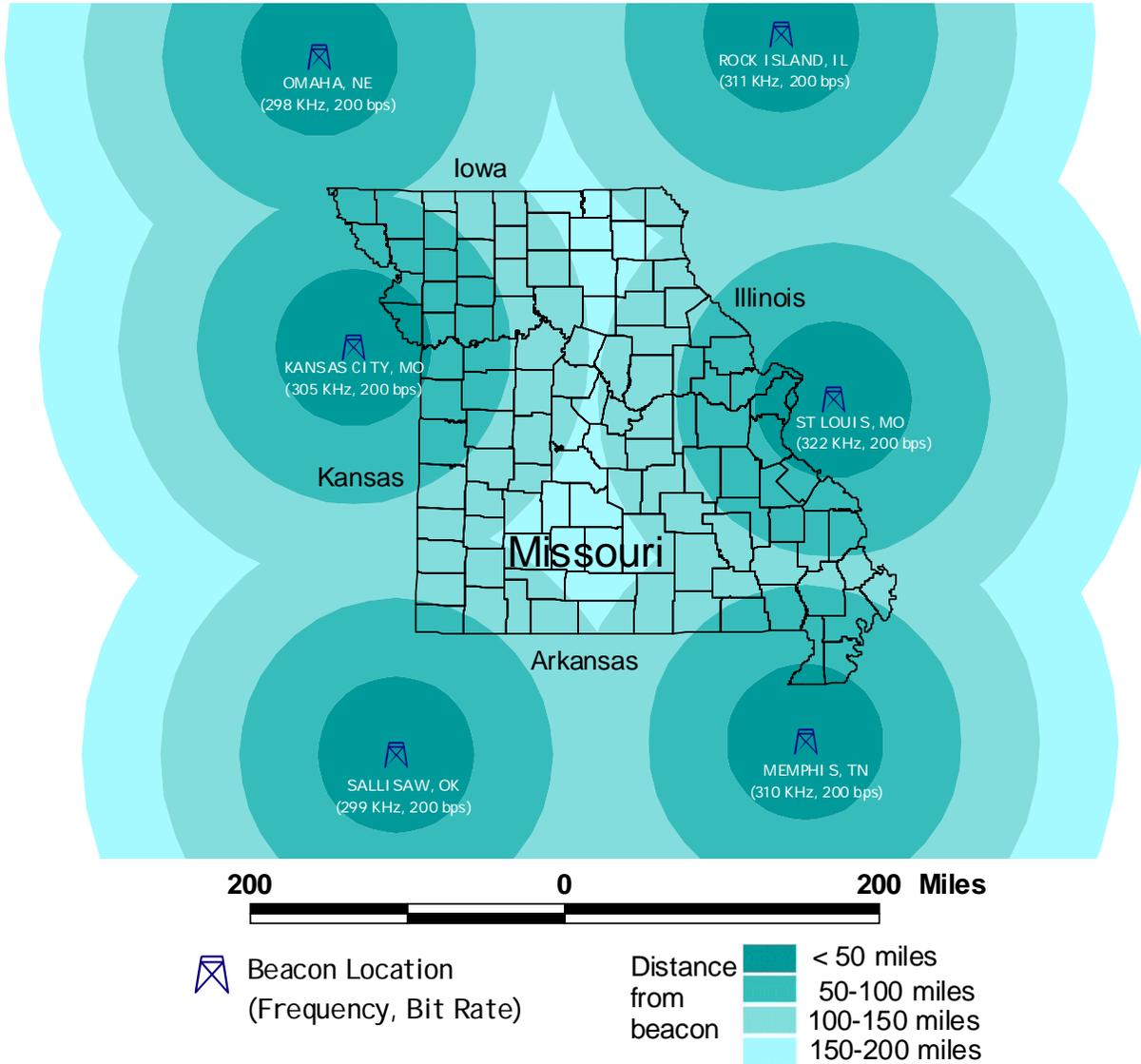
*Beacon* to **“User”** and then enter a known frequency and bit rate from the table below for one of the beacons available in Missouri:

<u>Location</u>	<u>Freq.</u>	<u>Bit Rate</u>
Kansas City, MO	305.0	200
Memphis, TN	310.0	200
Omaha, NE	298.0	200
Rock Island, IL	311.0	200
Sallisaw, OK	299.0	200
St. Louis, MO	322.0	200



Refer to the map on the next page to find the DGPS Beacon closest to your location. When a beacon signal is detected, “Status” should indicate “Receiving” and a value for “SNR” (signal to noise ratio) should appear. A “Distance” value may or may not appear. The GPS Info screen should indicate “3D Differential Location” in the status line. Also a “D” in or above a satellite strength indicator bar will indicate that differential corrections are being applied to that satellite.

## DGPS Beacons for Missouri



Additional beacon information and coverage areas can be obtained on the US Coast Guard website at <http://www.navcen.uscg.gov/dgps/>.

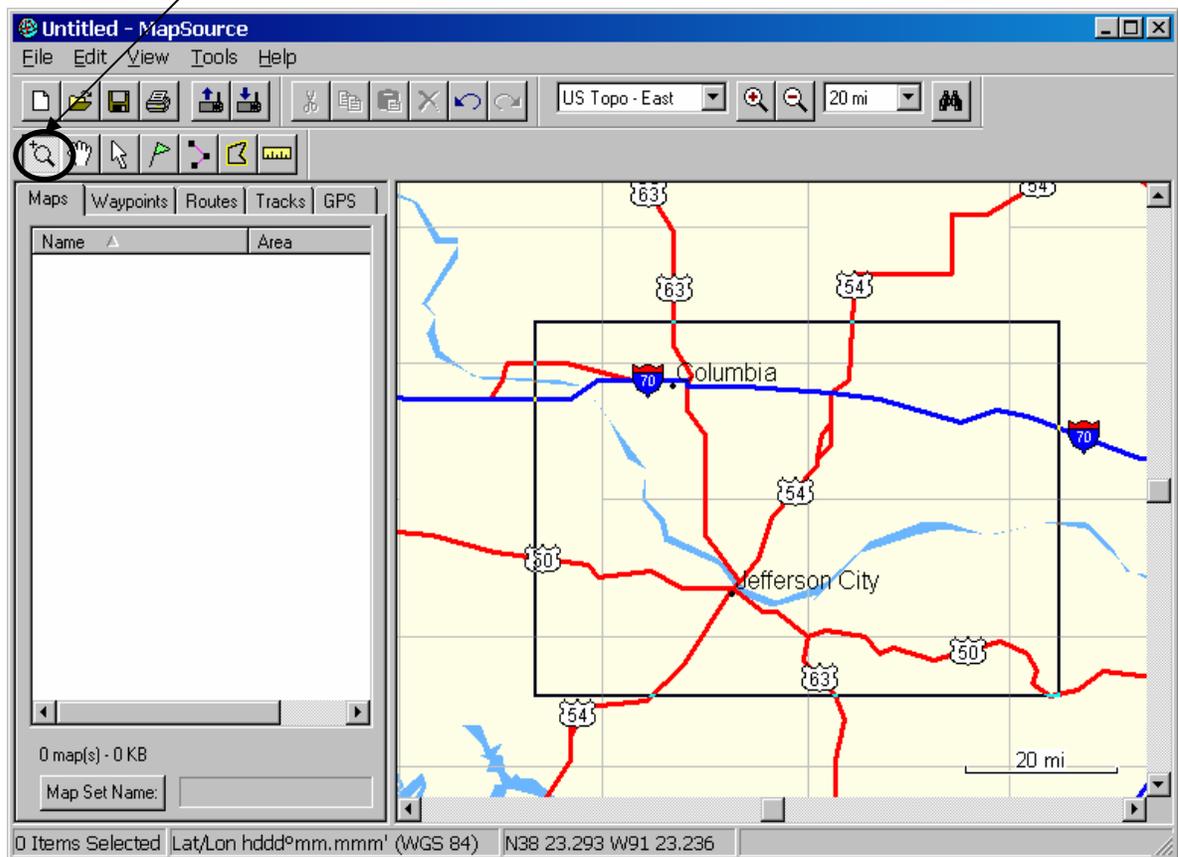
10. Press **QUIT** twice to return to the GPS Information screen.

## Loading Background Maps into Garmin

The Garmin MapSource TOPO software was included in the Configuration I GPS system. This software provides the capability to load maps into the Garmin receiver that contain contour lines as well as more detailed roads than the receiver's built-in maps. This would be very similar to adding a topo map (i.e., DRG) to a view in an ArcView project. MapSource divides a map into blocks or regions. These blocks do not correspond to the USGS quad map boundaries. In fact, a block might cover an area equivalent to that of 8-16 quad maps.

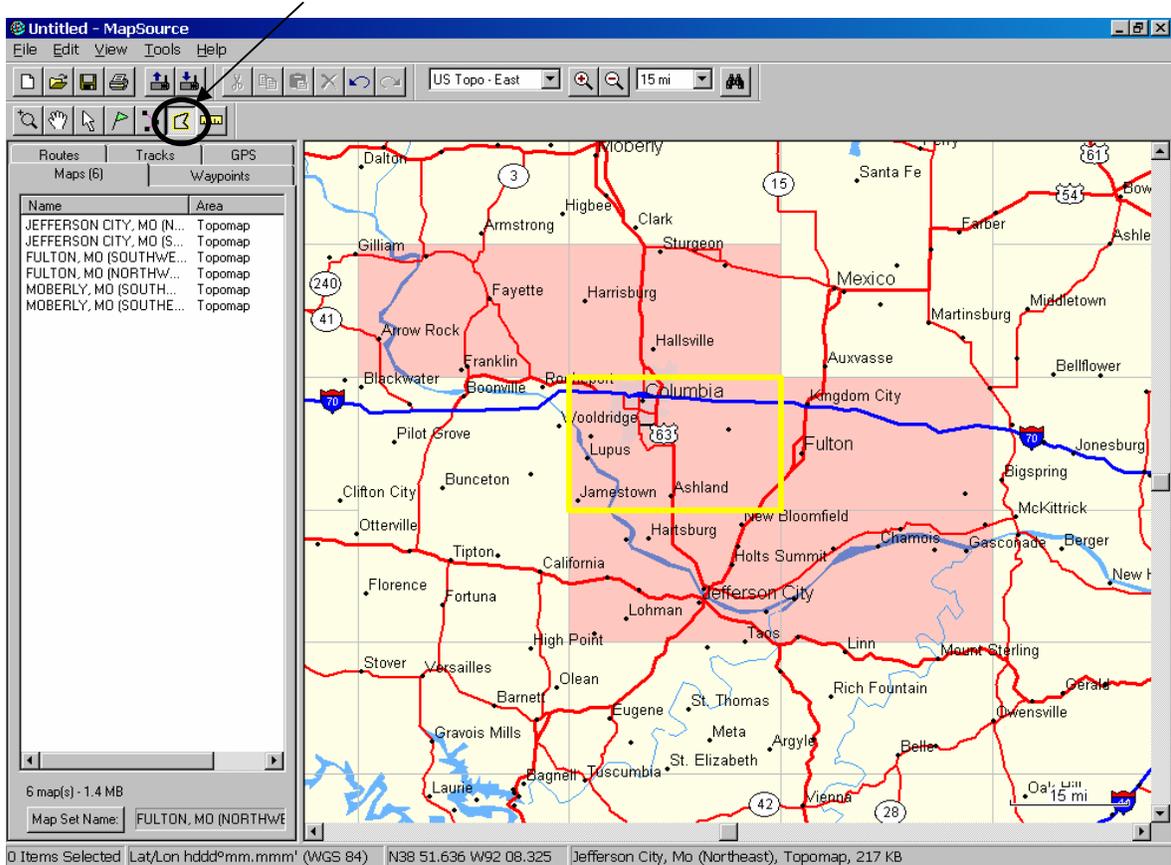
This procedure assumes that the MapSource TOPO software is installed on your computer. If not, you will need to install it before proceeding. These instructions guide you through loading background maps into the Garmin.

1. **Insert the Eastern US CD** (Disk 2 of 3) of MapSource TOPO into the computer.
2. **Start MapSource** program .
3. Use the **Zoom Tool** to draw a box around the area that you want to load the detailed maps from.



## Technology Technical Note MO-1

- Use the **Map Tool** to click on sections of the map to load into the GPSmap 76. When you click on a “block” of maps the area is outlined in yellow and the area that will be loaded becomes shaded. The names of selected blocks are listed under the Maps tab. To remove a block, simply click on it again.

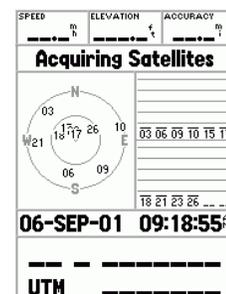


The GPSmap 76 can hold 8mb of map data, which is approximately 30-35 map blocks.

- Connect the GPSmap 76 to the computer.



- Turn on the GPSmap 76 (hold down red **POWER** key).
- Press the **ENTER** key (2 to 3 times) until you see the GPS Information Page.

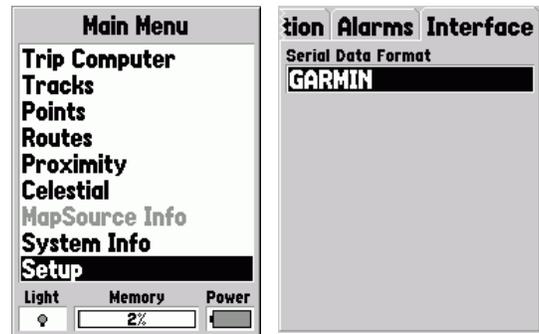


## Technology Technical Note MO-1

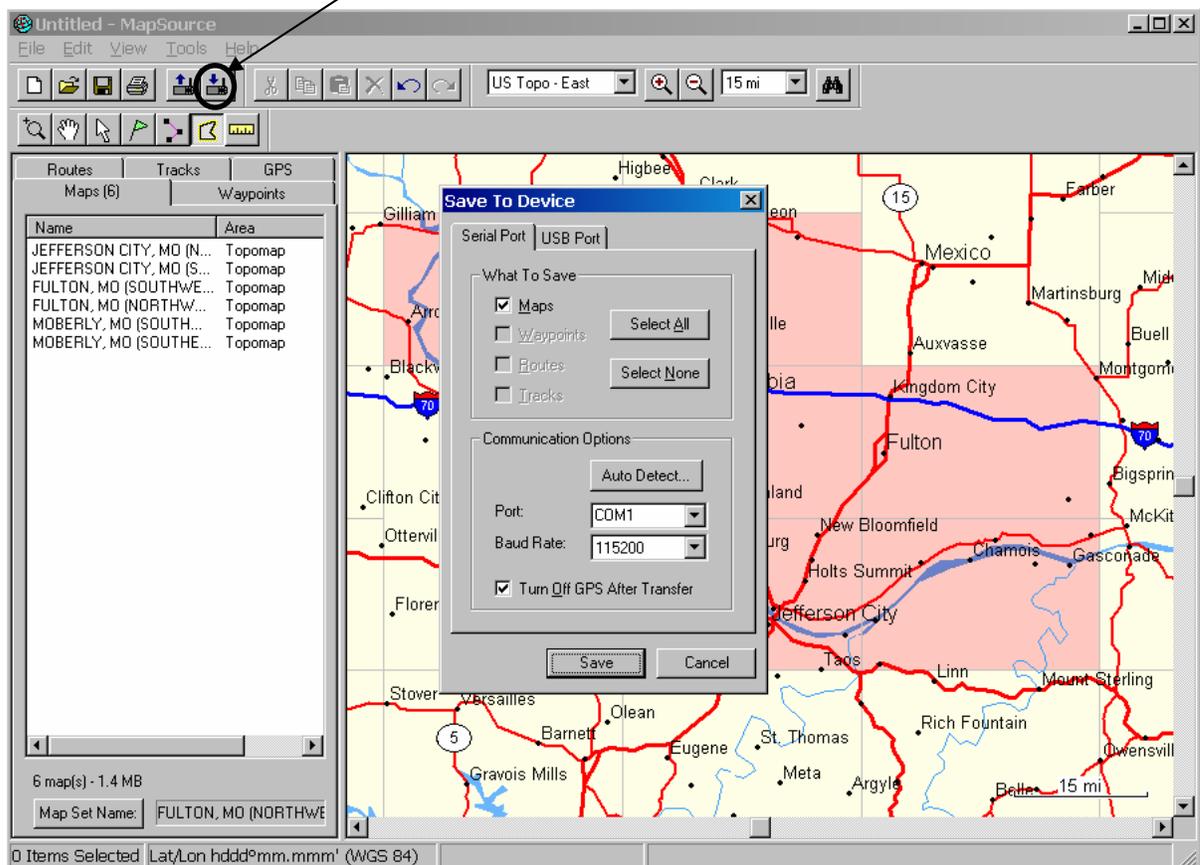
8. Press the **MENU** key. Select “Start Simulator”. Press the **ENTER** key.

9. Verify the “GARMIN” interface is selected:

- Press the **MENU** key two times.
- Use **ROCKER** key to select “Setup”; then press the **ENTER** key.
- Use **ROCKER** key to move left or right to select the *Interface* tab. Verify **Serial Data Format** is set to “GARMIN”. If not, toggle down and change the setting.



10. In MapSource, click the **Save to GPS** button.



- A pop-up window will appear with *Maps* checked. If you know which serial port you connected to the Garmin, set the port accordingly. If not known, click [Auto Detect..] and it should find the correct port. Baud rate can be set to 115200. If you encounter communication problems, you might try lowering the baud rate. Click the [**Save**] button.

11. After transfer is complete, exit MapSource.

## **Collecting GPS Data in the Field**

### ***Waypoints vs. Tracks***

Once set-up, the Garmin GPS offers two distinct methods of data collection – waypoints and tracks. Waypoints are individual locations stored in the GPS buffer. Each point must be consciously marked and stored by the user. The points are independent until the user, with ArcView or similar tool, relates them as nodes along a line or polygon, for example, based on their sequence. Tracks, on the other hand, are a continuous series of points collected automatically at a regular time or distance interval. The only user intervention is to start and finish a track log. Track points are treated by the GPS as points along a line or polygon boundary. Therefore, the GPS can estimate area bounded by tracks without downloading the points to GIS software (see page [18](#) for precautions about track area calculations).

The pros and cons of waypoints versus tracks are often debated. Features which consist of well-defined points (i.e. field boundaries, fences, pipelines, etc) can, in most cases, be captured more efficiently and accurately as individual waypoints. Points that are not well defined or that are non-linear (curved) (i.e. treatment areas, wetland boundaries, etc) are generally more accurately and efficiently captured using the track function. However, tracks with short collection intervals can quickly exceed the GPS storage buffer. Also, tracks collect data for wherever the GPS travels (including, e.g., diversions around wet areas) unless the user is careful to pause the track data collection when off-course. Finally, if using a vehicle to collect tracks, it is possible to traverse a critical bend in a boundary between capture of points and misrepresent the shape.

The user must ultimately choose a method best for each unique circumstance. Using the MN DNR Garmin ArcView extension, waypoints and tracks can be edited and processed into point, line or polygon themes for similar results.

## ***Required Accuracy Levels***

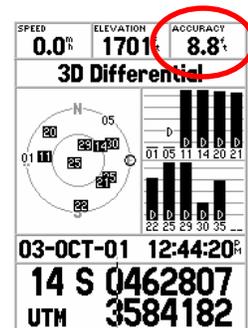
When collecting data with GPS in the field, certain accuracy levels need to be maintained in order to collect data as precisely as possible. This level of accuracy will depend on the type of data being collected as outlined below. Any collected points should also be verified by downloading them and overlaying them on appropriate imagery (e.g., aerial photo, topographic map, etc.) in ArcView or ArcMap.

### **Using GPS to Certify Conservation Practices**

When collecting data with GPS for use in certifying conservation practices, every attempt should be made to maximize accuracy. In order to make this possible, it is **required** that the Garmin GPSmap 76 be connected to the DGPS Beacon Receiver where beacon coverage is available. Data collected using DGPS is inherently more accurate and consistent than data collected with autonomous GPS.

**The user should only collect data when the following parameters have been met in the field:**

The Accuracy which is found on the GPS Information Page should always be **less than or equal to 10 ft.**



### **Using GPS for Conservation Planning**

In instances where absolute accuracy is not a requirement (i.e. Basic Conservation Planning, Resource Inventories, Navigation, etc.) the Garmin GPSmap 76 can be used without being connected to the DGPS Beacon Receiver. However, the following accuracy levels should be maintained for best results:

The Accuracy which is found on the GPS Information Page should always be **less than or equal to 20 ft.**

## Collecting GPS Data as Waypoints

Points that are well defined (i.e. wells, pipelines, fences, field boundaries, etc) can, in most cases, be more accurately and easily obtained by collecting GPS data as waypoints. Use the following procedure to collect waypoint data:

1. Make sure GPS unit is setup correctly (see [Garmin GPSmap 76 Setup](#) section page 6).
2. Place the GPS antenna (either the external antenna mounted on the backpack pole or the internal antenna of the Garmin receiver) directly over the point desired.
3. Wait until accuracy is below required value (see [Required Accuracy Levels](#) on page 14).
4. Press and hold down the **ENTER** key until the *Mark Waypoint* screen appears with the coordinates of your current location displayed. A default 3 digit number for the new waypoint will display. The user can either change this number or accept the default. If averaging is desired do the following, otherwise skip to step 5 below.



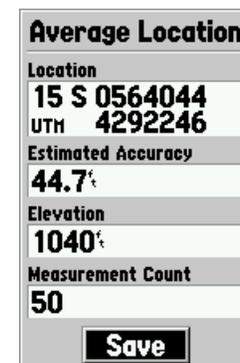
### Averaging

To improve the accuracy of a point, averaging can be used.

- a) Press the **MENU** key.
- b) Select "Average Location" and press the **ENTER** key.
- c) The *Average Location* screen should then appear.  
NOTE: Do not move GPS antenna while in this mode.



The *Measurement Count* field should start counting number of measurements used in the average. The *Estimated Accuracy* value should start decreasing. When you feel that enough measurements have been recorded to get a good average of your position, press the **ENTER** key to save the average.



5. While on the *Mark Waypoint* screen, highlight [OK] and press the **ENTER** key to store the point

**Important note: Keep good notes in the field!** Keeping notes of which waypoints go where will make data handling much easier when you get back to the office.

**Deleting Points**

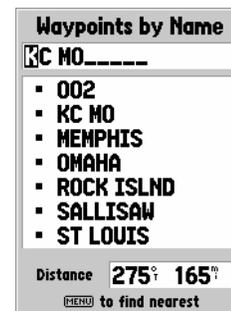
1. Press the **MENU** key twice.
2. Select “Points”. Press the **ENTER** key.
3. Select “Waypoints”. Press the **ENTER** key.



4. If you want to delete a single waypoint,
  - a. Highlight the desired point in lower window (you might want to refer to the tips on using the keypad earlier in this document).
  - b. Press the **MENU** key.
  - c. Select “Delete Waypoint”.
  - d. Highlight [Yes] and press the **ENTER** key to confirm the deletion.



5. If you want to delete all of the waypoints,
  - a. Press the **MENU** key.
  - b. Select “Delete All”.
  - c. Highlight [Yes] and press the **ENTER** key to confirm the deletion.



## Collecting GPS Data as Tracks

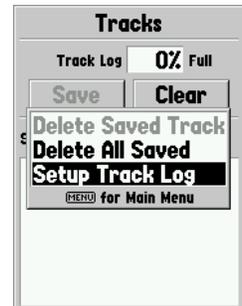
The “Track” feature can be used to more easily collect data for boundaries, treatment areas, etc. that might be difficult to define by manually marking waypoints (e.g., not well defined and non-linear or curved). It is also useful if you would like to determine an acreage estimate for an area while in the field. Before using tracks, however, the user should be fully aware of the issues related to using this feature in the Garmin (see the discussion under [Waypoints vs. Tracks](#) on page 13 as well as warnings given in this section). When collecting data as Tracks, setup the Garmin as follows:

1. Press the **MENU** key twice to bring up the *Main Menu*.
2. Select “Tracks”. Press the **ENTER** key.

Note: Before beginning a new track, you might consider clearing the stored track log (see instructions below).



3. On the *Tracks* page, press the **MENU** key.
4. Select “Setup Track Log”. Press the **ENTER** key.



5. On the *Track Log Setup* page, set *Recording* to “Off” to turn OFF tracking , or set *Recording* to either “**Stop When Full**” or “**Wrap When Full**” to turn ON tracking, The *Record Method* and *Interval* fields should be set appropriate to the need of the specific job. If “Auto” method is used, the interval “Most Often” should be used to give best results.
6. Highlight [OK] and press the **ENTER** key.



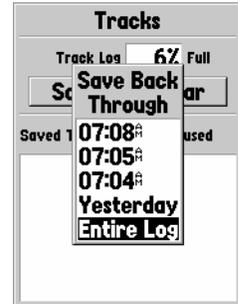
Keep in mind that the antenna needs to be kept as close as possible to the boundary being marked. If you need to divert from the boundary, you should turn off tracking. Upon returning to the boundary, turn on tracking to begin collecting data again. Two separate track segments will be created which can be joined in the DNR Garmin software (see instructions on page 28 in the [Editing the Track Data](#) section). This same technique can be used to define multiple features (i.e., turn off tracking to finish one feature and turn on tracking to begin marking the next feature).



## Calculating Area

The Garmin GPSmap 76 has the ability to calculate the area of a single track or multiple tracks that make up the same feature. The GPSmap 76 does not have the ability to compute the area from individual waypoints. **NOTE: This area should only be considered as an estimate (see important note below concerning official area calculations).** Follow these steps to compute the area of a Track:

1. From the *Tracks* page, Highlight **[Save]** and press the **ENTER** key.
2. You will be given the choice to save the entire track log, or if you have multiple segments, you can choose how far back to save. Make your choice and press the **ENTER** key.



**IMPORTANT:** In the process of saving a track, the GPS filters the track data. Be aware that the area calculated may vary somewhat from the area calculation you will get in ArcView from the unfiltered (original) track data. This variation will depend on how complex the original track data is. **Remember that official NRCS policy is to calculate area/lengths measured with a GPS in ArcView/Customer Service Toolkit before certifying a conservation practice.**



3. After viewing the area calculation of the track, highlight **[Delete]** and press the **ENTER** key to remove this saved track. The original track will remain stored in the GPS internal memory.

**Again, keep good notes in the field!** Keeping notes of which track segments go where will make data handling much easier when you get back to the office.



## Clearing the Track Log

If the track log memory becomes full or you wish to free up memory before beginning a new track, you will need to clear the entire existing track log as follows:

1. From the *Tracks* page, highlight **[Clear]** and press the **ENTER** key.
2. Highlight **[Yes]** and press the **ENTER** key.



## Using GPS Data

DNR Garmin (© 2001 Minnesota Dept. of Natural Resources) is software that communicates with the Garmin GPS receiver. Data (i.e., points and tracks) can be downloaded from the Garmin receiver and converted to a text file or to an ArcView shapefile. Data can also be uploaded from a text file or an ArcView shapefile to the Garmin receiver to be used for navigational purposes. These instructions are based on version 4.4.2 of the software and will provide procedures utilizing the extension in ArcView. The ArcView extension is currently not compatible with ArcMAP. To use DNR Garmin with ArcMap, refer to Appendix B for appropriate procedures to use. For more detailed information on the use of this program, refer to the DNR Garmin help file.

### **Garmin GPSmap76 Setup for Downloading**

1. Using the download cable (round Garmin connector on one end, 9-pin serial connector on the other end), connect the GPS unit to an open serial port on the computer.

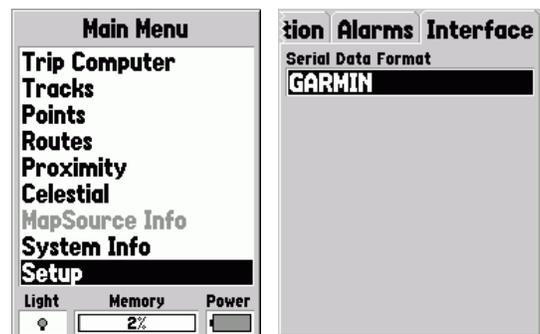


2. Turn on GPS unit. Press the **ENTER** key until the GPS Information screen appears.
3. Press the **MENU** key. Highlight "Start Simulator". Press the **ENTER** key. This will stop the unit from trying to acquire satellites and thus conserve battery power.



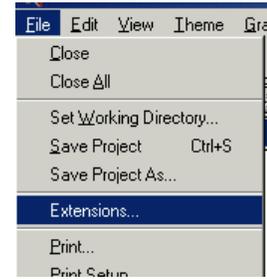
**IMPORTANT: The Garmin GPSmap 76 interface setup MUST always be returned to the **Garmin** format before attempting to download to ArcView using DNR Garmin!!!**

4. Verify the "GARMIN" interface is selected:
  - a. Press the **MENU** key two times.
  - b. Select "Setup"; then press the **ENTER** key.
  - c. Move left or right to select the *Interface* tab. Verify **Serial Data Format** is set to "**GARMIN**". If not, toggle down and change the setting.

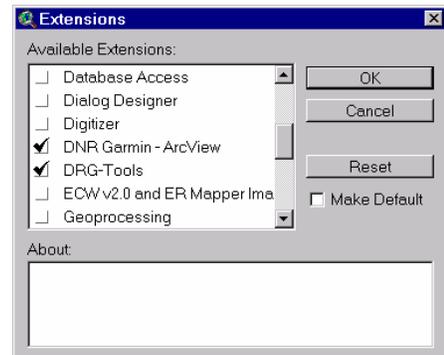


## DNR Garmin Setup

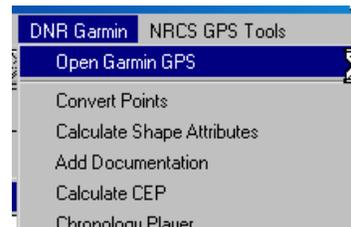
1. From ArcView's pull-down menus, select **File -> Extensions** to open the extensions dialog box.



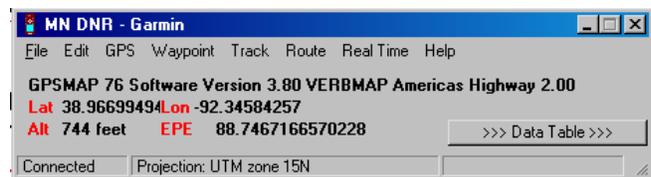
2. Choose "DNR Garmin – Arcview" by checking the box to the left of its name. Click **[OK]**. This will add "DNR Garmin" to the available ArcView View menus.



3. Select **DNR Garmin -> Open Garmin GPS** from the top menu.



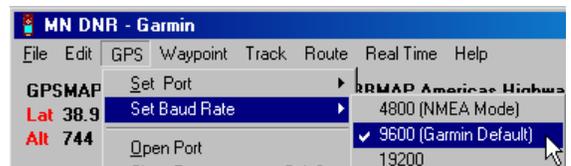
4. The program should load and a window similar to the one on the right should appear.



5. If the Garmin does not connect, select **GPS -> Set Port** and check that correct port is selected.



Also select **GPS -> Set Baud Rate** and check that correct baud rate (9600) is selected.

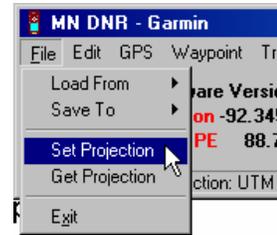


If it still does not connect, see the GPSmap76 section above on setting the interface correctly.

## Technology Technical Note MO-1

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6. When you run DNR Garmin for the first time, you should set the default projection. Do this by selecting **File -> Set Projection**.



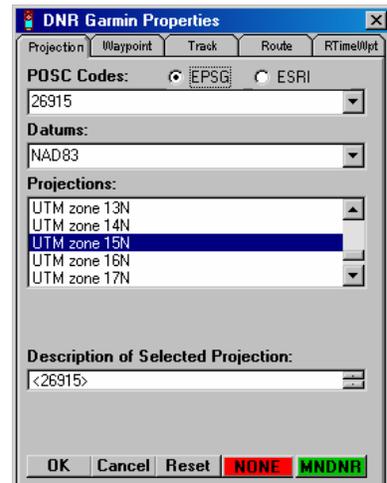
Under Datums, select **NAD83**.

Under Projections, select **UTM Zone 15N**.

For counties Cape Girardeau, Mississippi, New Madrid, Perry, Pemiscot, Scott, and Stoddard, you should select **UTM Zone 16N**.

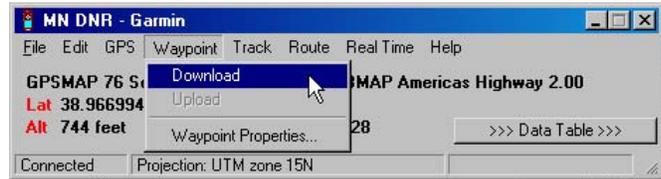
*(NOTE: This should match the projection in the DRGs, DOQQs, MrSID files, and other GIS data you intend to use).*

Click **OK**.

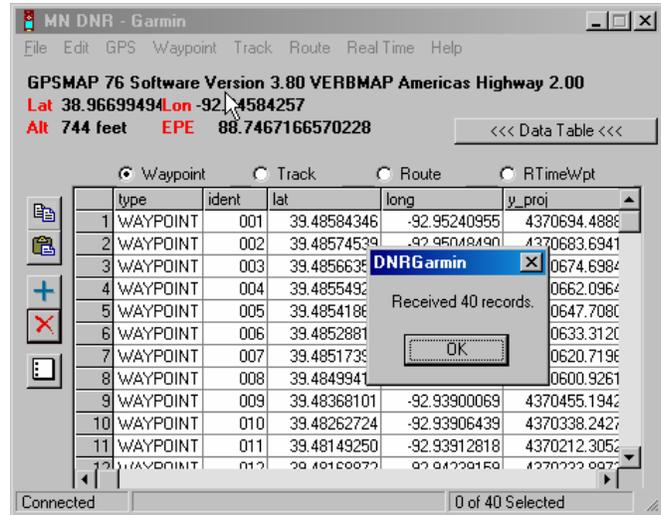


## Downloading GPS Data

1. Select **Waypoint -> Download** to download waypoints or **Track -> Download** to download tracks from the GPS.



2. The program will begin retrieving all waypoints or tracks stored in the GPS memory. When all records have been retrieved, a dialog box will appear that tells how many records have been received. Click **[OK]** to close this dialog box.



NOTE: If you are finished downloading, you can shut off the GPS unit to conserve battery life. Simply hold down the Power key until unit shuts off.

## Editing GPS Data

Click [**>>> Data Table >>>**] button (A) to bring up a table of waypoint or track data.

### Editing

Double-click on cell to change its value.

### Deleting Records

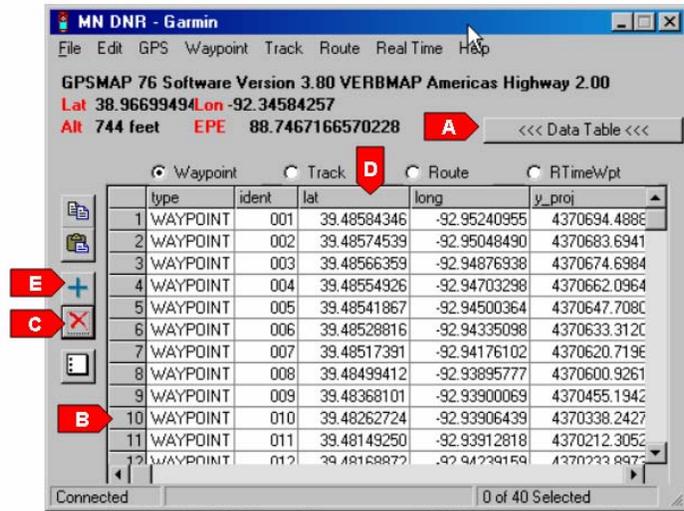
Select a single row by clicking on row number to left of desired row (B). Hold down mouse button and drag to select multiple rows. Press the **Delete** button (C) to delete highlighted record(s).

### Deleting Columns

Select a single column by clicking on column heading above of desired column (D). Hold down mouse button and drag to select multiple columns. Press the **Delete** button (C) to delete highlighted column(s).

### Adding Records

Press the **Add** button (E). This will add a row at the bottom. You can then enter the appropriate data for that record.



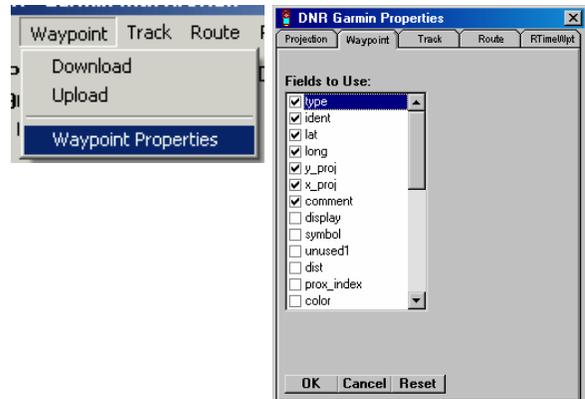
## Working with Waypoint Data Using DNR Garmin

Once you have successfully downloaded the data from the GPS, you can then edit the data and then save that data as an ArcView point shapefile. DNR Garmin also gives the user the capability to save the GPS data as a text file for later reference.

### Editing the Waypoint Data

Before saving the GPS data, it is useful to to remove unwanted columns of information. Generally speaking, the first seven columns of data (**type, ident, lat, long, x\_proj, y\_proj, comment**) are the only items that are typically needed. All other columns to the right should, in most cases, be removed before saving the data. In addition, any unwanted waypoints should also be removed before saving the data.

One way to remove columns is to select **Waypoint -> Waypoint Properties** . and then uncheck all the columns you do not want.



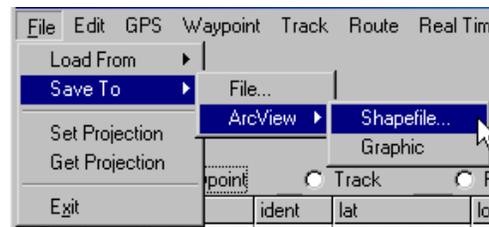
Another way is to simply delete the unwanted columns.

Refer to the previous section **Editing GPS Data** on how to delete columns and rows from the table.

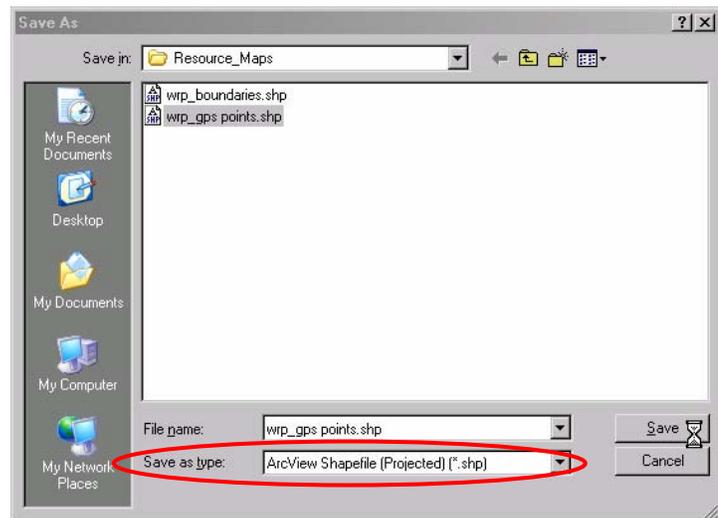
## Saving the Waypoints as an ArcView shapefile

After editing the waypoint data, you can then save the data as a new ArcView shapefile. If you do not want all the points, you can select a range of points. Do this by clicking the row number to the left of the first row and then, while holding down the Shift key, click on the last row in the desired range.

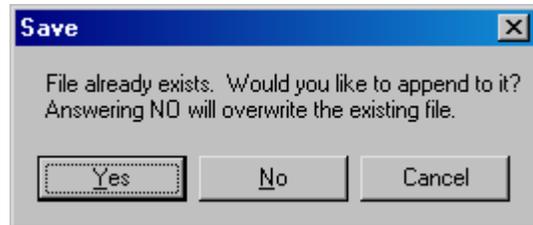
1. Select **File -> Save To -> ArcView -> ShapeFile....**



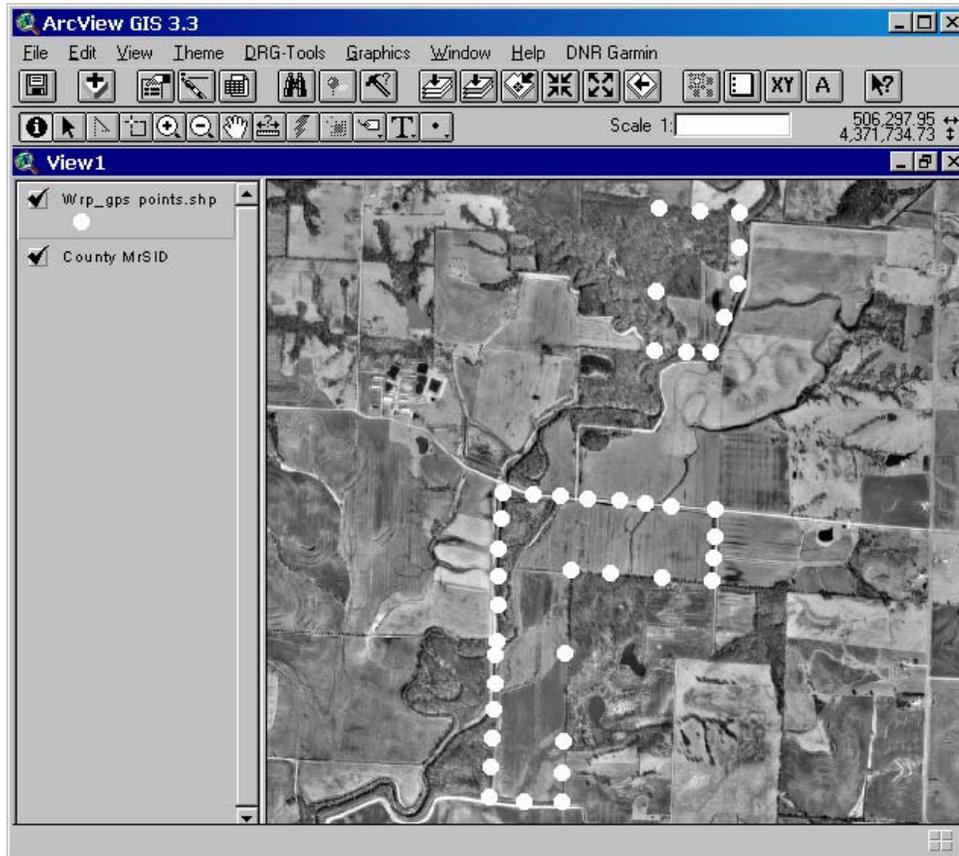
2. For "Save as type:", select **ArcView Shapefile (Projected) (\*.shp)**.  
Navigate to the desired drive and folder.  
Toolkit users: This would be **C:\Customer\_Files\_Toolkit\customer's name\Resource\_Maps**  
To create a new shapefile, give it a descriptive **File Name** and click **[Save]**.  
To append or overwrite an existing shapefile, select it and click **[Save]**



- If you select an existing file, you will be asked if you want to append to it or overwrite it. To append to the existing file, answer **Yes**. To overwrite the existing file (i.e., lose the existing points in the shapefile), answer **No**.



- A new theme is added to the View in ArcView.

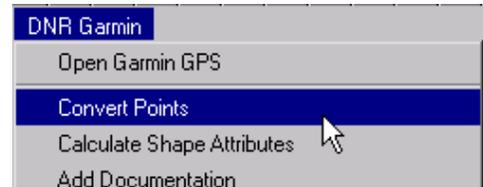


### Using DNR Garmin to Convert Waypoints to Lines or Polygons

A user may have a need to develop a line or polygon theme from the points obtained via GPS. One method of doing this would be with heads-up digitizing using the points as a guide (i.e., creating the theme and connecting the desired “dots”). This method allows the user to determine the order of the vertices in the line or polygon and also to ignore bad points. Another method is to use the “Convert Points” tool in the DNR Garmin extension. This tool will be the method discussed in this document. It requires a field (e.g., point number) that can be used as the order field. The values in this field would determine the order of the vertices in the new line or polygon. If a field is chosen that does not order the points in a sequential manner, an unexpected line or polygon could be the result.

The “Convert Points” tool can be used to convert points in an existing point theme to a new line or polygon shape. You can use the **Select Feature** tool in ArcView to select a subset of points from within a point theme to make a line or polygon from. If no features are selected, a line or polygon is created from all the points within the theme.

1. Start the tool by clicking **DNR Garmin -> Convert Points** on the View menu bar in ArcView.



2. The *Convert Points* dialog will open and present you with options for creating the new shape. The fields in this dialog have the following functions:

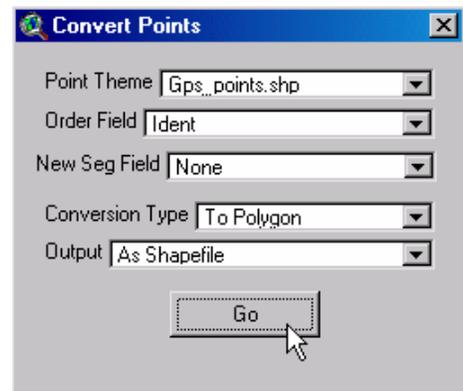
**Point Theme** – choose the point theme containing the points to convert

**Order Field** – the field in the point theme data table that will be used to specify the order of the vertices in the new shape. The field “**Ident**” is generally the one which you would use to order the waypoints.

**New Seg Field** – field to use to signal beginning of a new line segment. This would change from false to true to indicate a new line is starting.

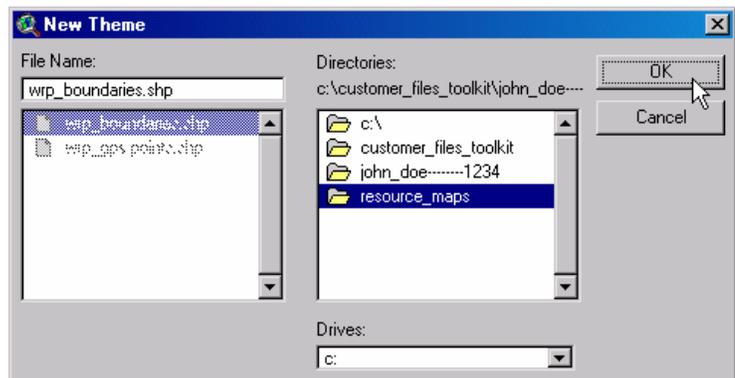
**Conversion Type** – specify if you want to create a new line or polygon

**Output** – specify if you want to create a new shapefile or just draw a graphic in the View.

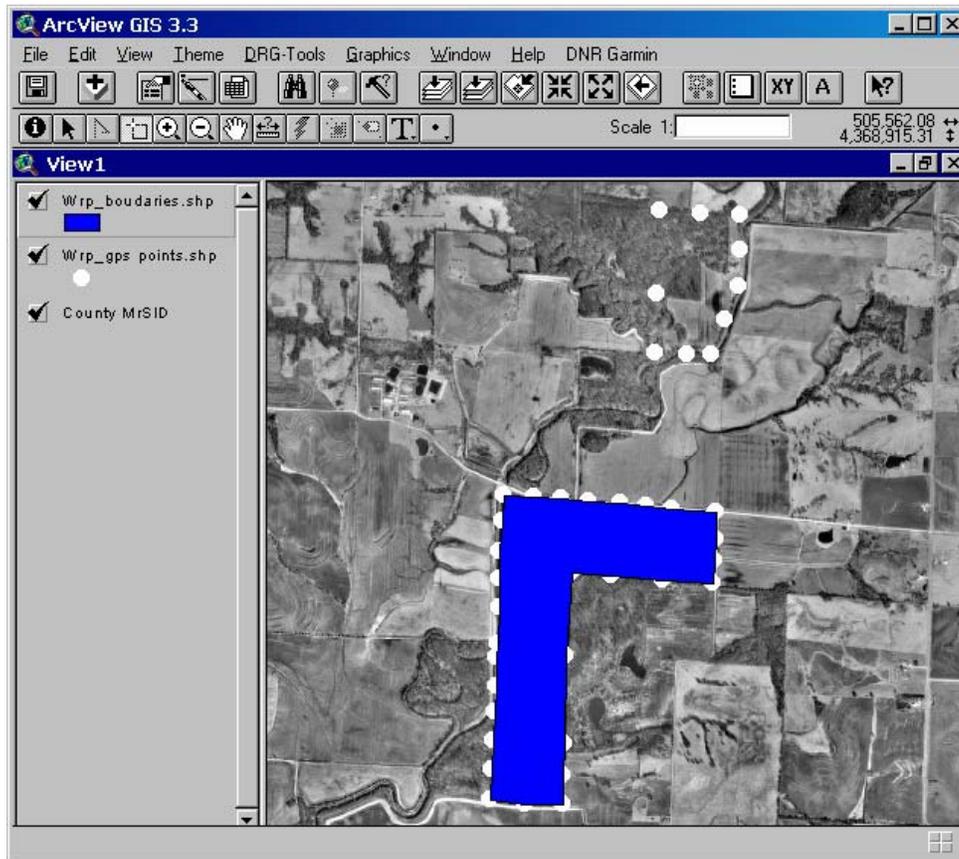


Press the **[Go]** button to create the new shape.

3. **Navigate** to the drive and folder where you would like to store the new shapefile. **Toolkit users:** This would be **C:\Customer\_Files\_Toolkit\customer's name\ Resource\_Maps**. Enter a descriptive **File Name** and click **[OK]**.



4. The new theme will be added to the View.



5. You can now close the *Convert Points* dialog box.

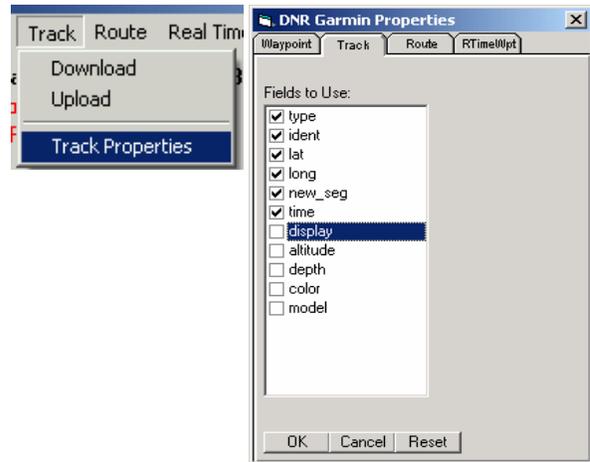
## Working with Track Data Using DNR Garmin

Once you have successfully downloaded the tracks from the GPS, you can then edit the data and import that data into ArcView as a point, line, or polygon shapefile or as graphic points, lines or polygons. DNR Garmin also gives the user the capability to save the GPS data as a text file for later reference.

### Editing the Track Data

Before saving the GPS data, it is useful to remove unwanted columns of information. Generally speaking, the first six columns of data (**type, ident, lat, long, new\_seg, time**) are the only items that are typically needed. All other columns to the right should, in most cases, be removed before saving the data. In addition, any unwanted trackpoints can also be removed before saving the data.

One way to remove columns is to select **Track -> Track Properties** . and then uncheck all the columns you do not want.

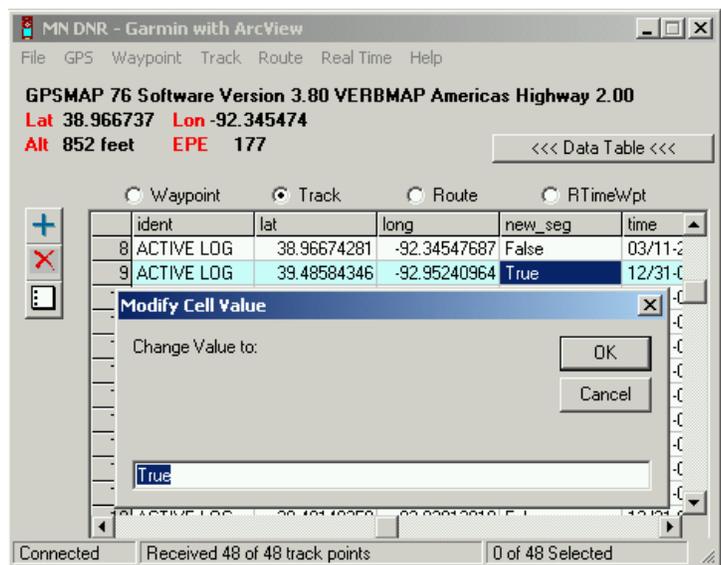


Another way is to simply delete the unwanted columns.

Refer to the previous section **Editing GPS Data** on how to delete columns and rows from the table.

If you have multiple tracks that make up the same polygon, you need to merge these tracks together before saving. In the DNR Table, the start of each track is highlighted in blue. To merge two or more tracks, double click on the cell in the **new\_seg** column which corresponds to the track that you want to merge with the previous track. Change the value from True to **False**.

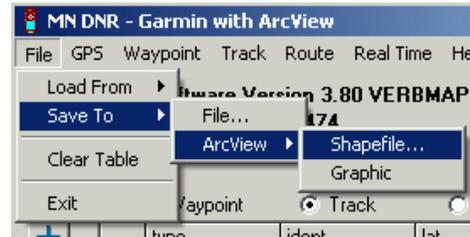
To split (i.e., divide) one track into two, change the value from False to **True**.



### Saving the Tracks as an ArcView shapefile

After editing the track data, you can then save the data as a new ArcView shapefile (point, line or polygon) or append the track data to an existing theme already in ArcView.

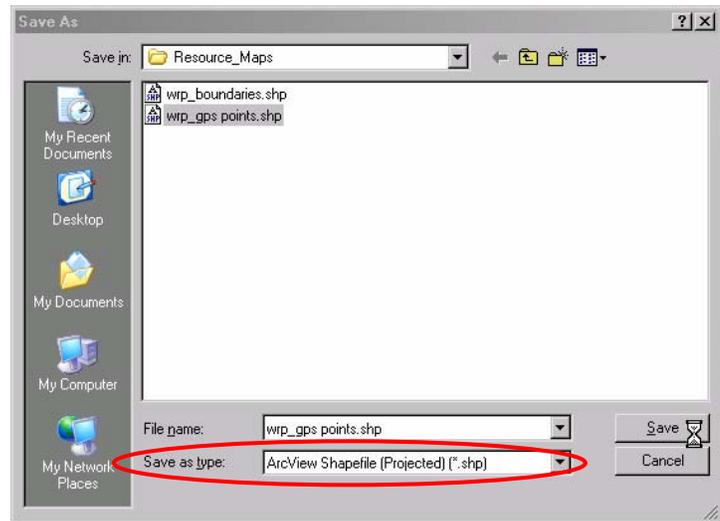
1. Select **File -> Save To -> ArcView -> Shapefile...**



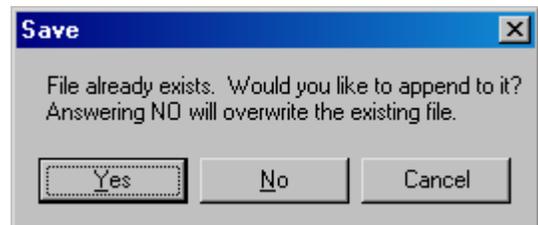
2. For "Save as type:", select **ArcView Shapefile (Projected) (\*.shp)**.  
Navigate to the desired drive and folder.

Toolkit users: This would be *C:\Customer\_Files\_Toolkit\**customer's name**\Resource\_Maps*

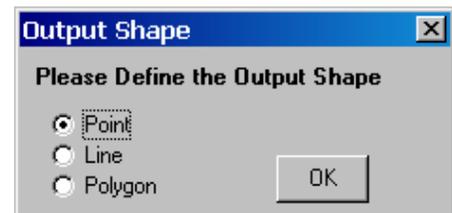
To create a new shapefile, give it a descriptive **File Name** and click [**Save**].  
To append or overwrite an existing shapefile, select it and click [**Save**]



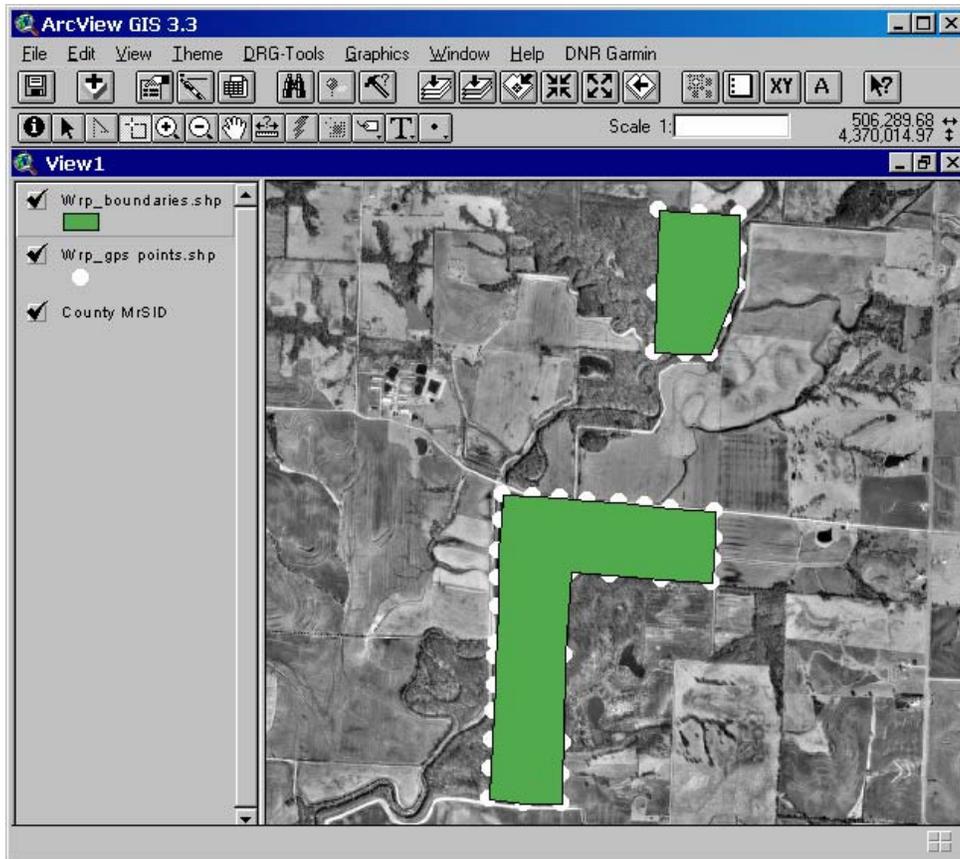
3. If you select an existing file, you will be asked if you want to append to it or overwrite it. To append to the existing file, answer **Yes**. To overwrite the existing file (i.e., lose the existing points in the shapefile), answer **No**.



4. Select the output type for the data. It is recommended you use "Point" so that you can preview the points. You could then use "Convert Points" to create a shape file using only desired points. Click [**OK**].



5. The points, lines, or polygons will be added to the selected shapefile. If this shapefile was not a theme in the current view, it will be added as a new theme in ArcView. Each individual track that came from DNR will be a separate polygon or line feature within the theme.



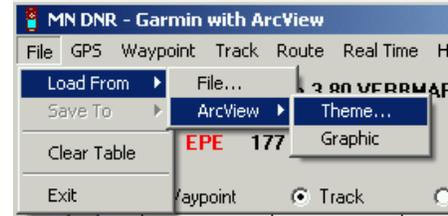
## ***Uploading ArcView Data to the GPS Using DNR Garmin***

DNR Garmin has the capability to upload position data from ArcView shapefiles to the GPS. This allows you to store positions of features obtained or developed via ArcView into the GPS unit. These stored positions can then be used in locating those features in the field (see [Navigating with the Garmin GPSmap 76](#) on page 34)

### **Uploading Waypoints**

Waypoints can be loaded into the GPS from ArcView point themes or graphics in the active view. In order to upload waypoints from themes, the theme must be active. DNR Garmin will only upload the selected features of the theme, if there are any selected. If there are no selected points in the theme, all points will be uploaded. Only selected graphics will be uploaded.

1. Click on **File ->Load From** and select **ArcView -> Theme...**, or **ArcView -> Graphic** to begin uploading waypoint data into the DNR Garmin table.



2. If the shape attribute table does not have an *IDENT* or *COMMENT* field, DNR Garmin will open a dialog box asking what values from the shape attribute table you want to use for the *IDENT* and *COMMENT* fields. The *IDENT* field will be loaded into the GPS as the Waypoint number. Selecting "Sequential ID" will number each point sequentially starting at 1. Select the desired choices for each field and click **[OK]**. Clicking **[Cancel]** will abort the load.

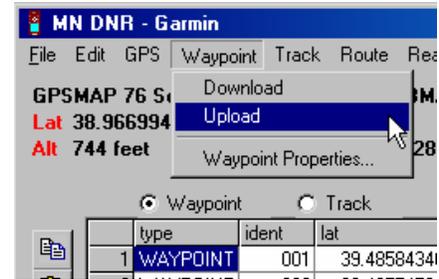


If you are loading graphics as waypoints they will automatically be assigned sequential *idents* and the *comment* field will default to the current date/time, since graphics do not have attributes.

3. The points should then be loaded into the DNR Garmin data table and can be edited if desired. **A word of caution!** The program will overwrite any waypoints on the GPS unit that have the same *ident* as a waypoint being uploaded.

4. Upload the waypoints in the table to the GPS by selecting **Waypoint -> Upload** from the DNR Garmin menu.

NOTE: If any rows are selected in the table, only those points will be uploaded.



5. A message box will appear once the download has been completed. Press the **[OK]** button.

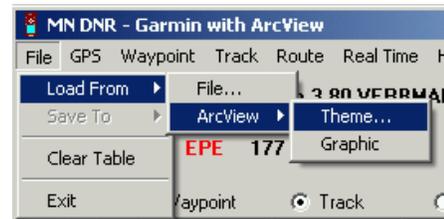


The data has been loaded to the GPS and is ready to go to the field.

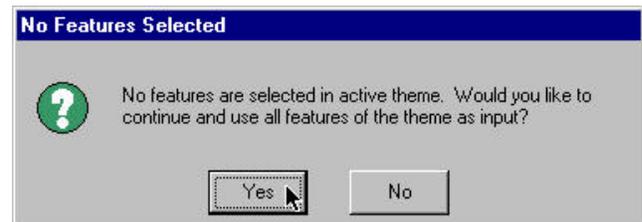
## Uploading Tracks

Tracks can be loaded into the GPS from line or polygon themes or graphics in the active view. In order to upload tracks from themes, the theme must be the active theme. DNR Garmin will only upload the selected features from the theme, if there are any selected. If there are no selected features in the active theme, all features will be uploaded after confirmation. Only selected graphics will be uploaded.

1. Click on **File -> Load From** and select **ArcView -> Theme...**, or **ArcView -> Graphic** to begin uploading track data into the DNR Garmin table

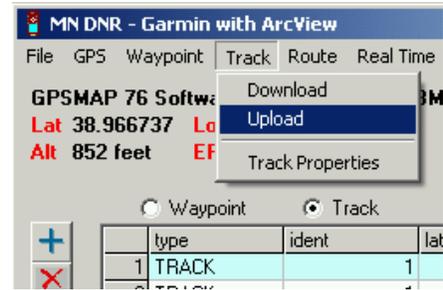


2. If no features are selected in the active themes that you are uploading, DNR Garmin will display a dialog asking if you want to load all features in the shapefile. Press **[Yes]**.



The Track data can be edited in the DNR Garmin table if desired.

3. Upload the tracks in the table to the GPS by selecting **Track -> Upload** from the DNR Garmin menu.



4. A message box will appear once the download has been completed. Press the **[OK]** button.



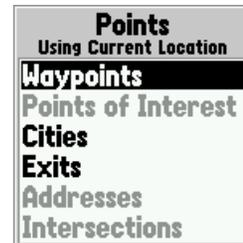
The data has been loaded to the GPS as part of the internal track log. It will not show up as a saved track. The “bread crumb” trail will show, however, on the map page of the receiver.

## ***Navigating with the Garmin GPSmap 76***

The Garmin GPSmap 76 can be used to navigate to (i.e., locate) any of its stored points (e.g., those uploaded in the previous section). This can be very useful for locating features such as well heads, wetland boundaries, etc, or for laying out conservation practices such as fences, brush management, or grass plantings.

### **Navigating to a Point**

1. To navigate to a point, press the **NAV** key.
2. Highlight “Go To Point” and press the **ENTER** key.
3. Highlight “Waypoints” and press the **ENTER** key.



4. One of 2 screens will appear, *Waypoints by Name* or *Nearest Waypoints* . Use the **MENU** key to switch between the two. (Note: The bottom of each screen shows direction and distance to highlighted point).

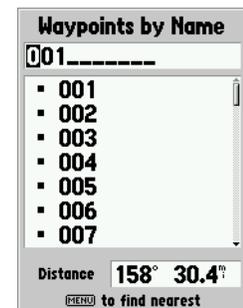
#### *Waypoints by Name*

Points are sorted by name.

Select desired point

(see [Tips on using Garmin keypad](#) on page 3).

Press the **ENTER** key.

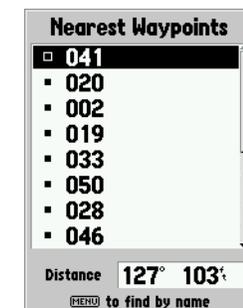


#### *Nearest Waypoints*

Points are sorted by distance from your current position (nearest being listed first).

Highlight desired point using up/down of **ROCKER** key.

Press the **ENTER** key.



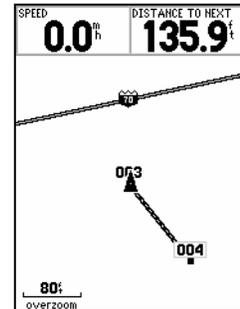
- The *Waypoint* screen will appear.  
Highlight [Goto] and press the **ENTER** key.



- Use the **PAGE** key to switch to the *Map Page*.

This shows your current location as a triangle near the center of the screen and a line to the point you are navigating to. The line indicates the direction you need to go (North is toward top of screen). Zoom In and Out keys can be used to change scale of map.

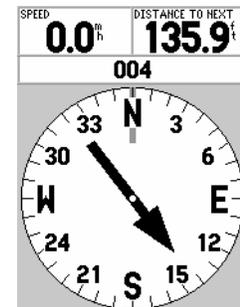
Example at right instructs you to move southeast 135.9 feet.



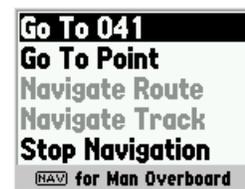
- An alternative to the *Map Page* is the *Pointer Page*.  
Use the **PAGE** key to switch to the *Pointer Page*.

This shows a compass ring. The vertical line near the top of the ring indicates your direction of travel. The large pointer indicates the direction you need to travel to reach the navigation point.

Example at right shows that you are moving north and that you actually need to be moving southeast 135.9 feet.



- Once point is found, press the **NAV** key and select
  - “Go To Point” to find another point, or
  - “Stop Navigation” to end.
- Press the **ENTER** key.





## Appendix A – Field Guides

The “Field Guides” below are simply instruction “cards” that can be printed, cut out, and laminated to carry along with the Garmin GPSmap 76 GPS unit in the field. They are basically a 4”x6” size that can be carried in a shirt pocket or in the GPS backpack. If desired, you could laminate 2 of them back to back to reduce the number of cards.

### “Complete SETUP” Field Guide

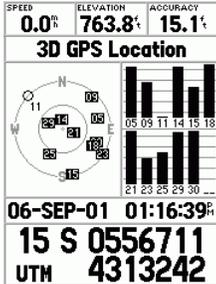
Garmin GPSmap76 - Complete SETUP																								
Press <b>MENU</b> twice, select “ <b>SETUP</b> ”, use <b>ROCKER</b> key (left or right) to select <b>tabs</b> below. Use <b>ROCKER</b> key to move to desired field and change to value shown.																								
			<b>(for backpack use)</b>																					
<b>General</b>	<b>Time</b>	<b>Location</b>	<b>Interface</b>																					
Mode <b>Normal</b> WAAS <b>Enabled</b> Backlight Timeout <i>user preference</i> Beeper <i>user preference</i> Language <b>English</b>	Time Format <i>user preference</i> Time Zone <b>Central</b> Daylight Savings Time <b>Auto</b>	Location Format <b>UTM UPS</b> Map Datum <b>NAD83</b> North Reference <b>True</b>	Serial Data Format <b>RCTM In/NMEA Out</b> Baud <b>4800</b> Beacon Freq Bit Rate <b>User ###.# ###</b>																					
			<table border="1"> <thead> <tr> <th>Location</th> <th>Freq</th> <th>Bit Rate</th> </tr> </thead> <tbody> <tr> <td>KC,MO</td> <td>305.0</td> <td>200</td> </tr> <tr> <td>Memphis,TN</td> <td>310.0</td> <td>200</td> </tr> <tr> <td>Omaha,NE</td> <td>298.0</td> <td>200</td> </tr> <tr> <td>Rock Island,IL</td> <td>311.0</td> <td>200</td> </tr> <tr> <td>Salisaw,OK</td> <td>299.0</td> <td>200</td> </tr> <tr> <td>St.Louis,MO</td> <td>322.0</td> <td>200</td> </tr> </tbody> </table>	Location	Freq	Bit Rate	KC,MO	305.0	200	Memphis,TN	310.0	200	Omaha,NE	298.0	200	Rock Island,IL	311.0	200	Salisaw,OK	299.0	200	St.Louis,MO	322.0	200
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The settings on the <b>Units</b> and <b>Alarms</b> tabs can be set as the user desires. From the <b>General</b> tab, scroll left once to reach the <b>Interface</b> tab, which will be changed frequently (i.e., switching between field use and downloading). The settings on the other tabs will not require changing once they are set.			<b>(for downloading)</b>																					
			<b>Interface</b>																					
			Serial Data Format <b>GARMIN</b>																					
10/1/2003																								

**“Interface SETUP for Backpack Use” Field Guide**

Garmin GPSmap76 – Interface SETUP for Backpack Use																							
<ul style="list-style-type: none"> <li>• Press <b>MENU</b> button twice.</li> <li>• Select “<b>SETUP</b>” and press the <b>ENTER</b> key.</li> <li>• Scroll left once using the <b>ROCKER</b> key to the <b>Interface</b> tab.</li> <li>• Move down to <i>Serial Data Format</i> field using the <b>ROCKER</b> key. Press the <b>ENTER</b> key.</li> <li>• Select “<b>RTCM In/NMEA Out</b>” and press the <b>ENTER</b> key.</li> <li>• Move down to <i>Beacon</i> field using the <b>ROCKER</b> key. Press the <b>ENTER</b> key.</li> <li>• Select “<b>User</b>” and press the <b>ENTER</b> key.</li> </ul>																							
<ul style="list-style-type: none"> <li>• Move right to <i>Freq</i> field using the <b>ROCKER</b> key.</li> <li>• Press the <b>ENTER</b> key.</li> <li>• Select number using up or down of <b>ROCKER</b> key. (See table at right for appropriate frequencies).</li> <li>• Move to next digit by pressing right on <b>ROCKER</b> key and repeat number selection.</li> <li>• Press the <b>ENTER</b> key to accept number.</li> <li>• Repeat same procedure for <i>Bit Rate</i> if it needs to be changed.</li> </ul>	<table border="1"> <thead> <tr> <th style="text-align: left;"><u>Location</u></th> <th style="text-align: left;"><u>Freq</u></th> <th style="text-align: left;"><u>Bit Rate</u></th> </tr> </thead> <tbody> <tr> <td>KC,MO</td> <td>305.0</td> <td>200</td> </tr> <tr> <td>Memphis,TN</td> <td>310.0</td> <td>200</td> </tr> <tr> <td>Omaha,NE</td> <td>298.0</td> <td>200</td> </tr> <tr> <td>Rock Island,IL</td> <td>311.0</td> <td>200</td> </tr> <tr> <td>Salisaw,OK</td> <td>299.0</td> <td>200</td> </tr> <tr> <td>St.Louis,MO</td> <td>322.0</td> <td>200</td> </tr> </tbody> </table>	<u>Location</u>	<u>Freq</u>	<u>Bit Rate</u>	KC,MO	305.0	200	Memphis,TN	310.0	200	Omaha,NE	298.0	200	Rock Island,IL	311.0	200	Salisaw,OK	299.0	200	St.Louis,MO	322.0	200	
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<p>Press the <b>QUIT</b> key to return to the main menu.</p> <p><b>NOTE:</b> Remember to set <i>Serial Data Format</i> field to “<b>Garmin</b>” when you return to the office to download your data.</p>																							
<p>10/1/2003</p>																							

**“Marking Points” Field Guide**

**Marking (and entering) Points  
w/Garmin GPSmap76**

	<p>&lt; Accuracy should be     &lt;= 10 ft for certifying</p> <p>    &lt;= 20 ft for planning</p> <p>&lt; should be UTM coordinates</p>
---	---

☞ Press and hold **ENTER** key ☞

	<p>&lt; change point name as     desired</p> <p>&lt; should be UTM coordinates (you can manually enter a point by entering coordinates here)</p> <p>Highlight <b>[OK]</b> and &lt; press <b>ENTER</b></p>
---	---

To improve accuracy, averaging can be used:  
Press **MENU**; select **Average Location**; do not move  
GPS unit while measurements are collected; press  
**ENTER** to save the point when desired count has been  
reached.

4/15/2004

***“Deleting/Navigating to Points” Field Guide***

<b>Deleting Points</b>	<b>GARMIN GPSmap76</b>	<b>Navigating to Points</b>
Press <b>MENU</b> twice. Select “Points” Select “Waypoints”		Press <b>NAV</b> key. Select “Go To Point” Select “Waypoints”
Highlight point using <i>Nearest Waypoint</i> , or <i>Waypoints by Name</i> page		Select point using <i>Nearest Waypoint</i> , or <i>Waypoints by Name</i> page
Press <b>MENU</b> . Select “Delete Waypoint” or “Delete All”		Select [GoTo] on waypoint page
Confirm the deletion by selecting [Yes].		Use <i>Map</i> or <i>Pointer</i> page to guide you to the point.
		10/1/2003

**“Starting/Stopping Track Logs” Field Guide**

<b>Starting Track Log</b>	<b>GARMIN GPSmap 76</b>	<b>Stopping Track Log</b>
<p>Press <b>MENU</b> twice Select “Tracks”</p> <p>Press <b>MENU</b>. Select “Set Up Track Log”</p>	<p>Press <b>MENU</b> twice Select “Tracks”</p> <p>Press <b>MENU</b>. Select “Set Up Track Log”</p>	
<p>To turn <b>ON</b> tracking, set Recording: <b>Stop when full</b> or <b>Wrap when full</b> Record Method &amp; Interval <b>As needed for specific job. If Auto method is used, select “Most Often”.</b> Highlight [OK] and press <b>ENTER</b>.</p>	<p>To turn <b>OFF</b> tracking, set Recording: <b>Off</b></p> <p>Highlight [OK] and press <b>ENTER</b>.</p>	
<p>Press <b>PAGE</b> until <i>Map</i> page is displayed to view “bread crumbs”.</p>		
<p>Travel around desired area. <b>TRY NOT TO STRAY OFF TRACK WHILE LOGGING IS ON!</b> When finished, turn track log off as follows: &gt;&gt;&gt;&gt;&gt;&gt;</p>		

10/1/2003

**“Calculate Area/Clear Track Log” Field Guide**

<b>Calculate Area</b>	<b>GARMIN</b>	<b>Clear Track Log</b>
Press <b>MENU</b> twice Select “Tracks”  Highlight [Save] and press <b>ENTER</b> key.		Press <b>MENU</b> twice Select “Tracks”  Highlight [Clear] and press <b>ENTER</b> key.
Select desired track segment.  A page appears with the calculated <i>Area</i> .  REMEMBER: This area is just an <i>estimate</i> and should be used as such.		Highlight [Yes] and press <b>ENTER</b> key.  This will clear the entire track log memory.
<b>===== NOTE =====</b> Because saving a track filters the data, the track <b>SHOULD NOT BE SAVED</b> . Make sure to delete it!.		
Highlight [Delete] and press <b>ENTER</b> key.  Highlight [Yes] and press <b>ENTER</b> key.		
10/1/2003		

## **Appendix B – DNR Garmin with ArcMap**

DNR Garmin (© 2001 Minnesota Dept. of Natural Resources) is software that communicates with the Garmin GPS receiver. It is made up of a Visual Basic standalone component and an ArcView extension component. The ArcView extension component is not compatible with ArcMap (the GIS software being utilized in Customer Service Toolkit 2004). This means that the functionality provided by this extension will not be available via ArcMap. If a user needs a tool provided by the extension, they will need to use ArcView. Any shapefile created/modified in ArcView can then be added as a layer in ArcMap via standard procedures.

The purpose of this appendix is to provide instructions on using the standalone component of DNR Garmin Version 4.4.2 in conjunction with ArcMap 8.3 (i.e., without the need for ArcView). Since the procedures are very similar to those detailed earlier in this document for use with ArcView, reference will be made to the appropriate sections and only differences will be explained in detail here. The standalone program is basically used to download from and upload to the Garmin GPS receiver and to save or load ArcView shapefiles, which are processed by ArcMap.

### ***Standalone DNR Garmin Setup***

Instead of loading DNR Garmin through ArcView, the standalone component is loaded as follows:

From the Start button, select  
All Programs  
-> **DNRGarmin** -> **DNRGarmin**  
to start the program.



Or click on the desktop icon



Once DNR Garmin is loaded, you should refer to [DNR Garmin Setup](#) (page 20), steps 4 through 6 for setup instructions.

### ***Downloading & Editing GPS Data***

Refer to [Downloading GPS Data](#) (page 22) and [Editing GPS Data](#) (page 23) sections for instructions. The procedure is the same.

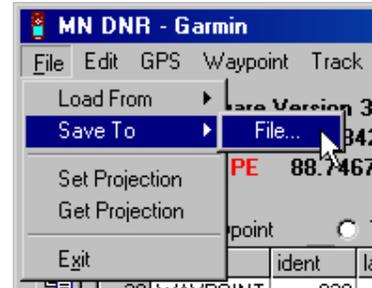
## Working with Waypoint Data Using Standalone DNR Garmin

The procedures for working with the waypoint data are basically the same as those given earlier in the [Working with Waypoint Data Using DNR Garmin](#) on page 23. The main differences pertain to saving the waypoints and converting waypoints to lines or polygons. These are detailed below.

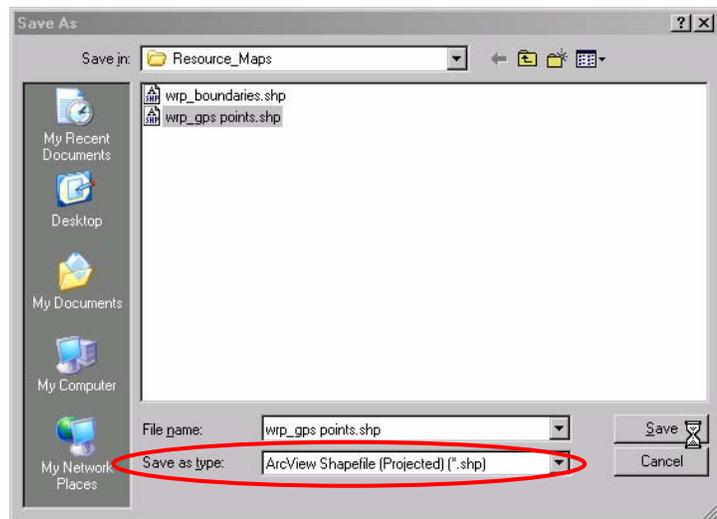
### Saving the Waypoints as an ArcView shapefile

After editing the waypoint data, you can then save the data as a new ArcView shapefile or append to an existing one. Note: If no rows are selected, all the data will be saved. If some rows are selected, only that data will be saved.

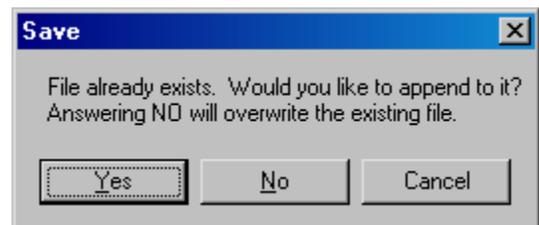
1. Select **File -> Save To -> File....**



2. For "Save as type:", select **ArcView Shapefile (Projected) (\*.shp)**.  
Navigate to the desired drive and folder.  
Toolkit users: This would be `C:\Customer_Files_Toolkit\customer's name\Resource_Maps`  
To create a new shapefile, give it a descriptive **File Name** and click [**Save**].  
To append or overwrite an existing shapefile, select it and click [**Save**]



3. If an existing file was chosen, you will be asked about appending to it.  
Answer  
**Yes** to append to the file,  
**No** to overwrite the file, or  
**Cancel** to abort the save.



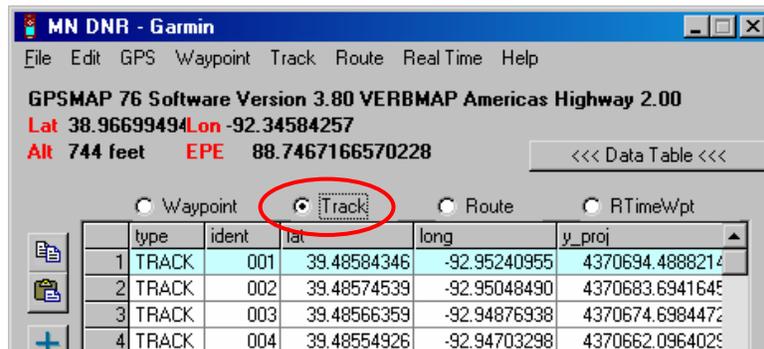
4. A message should then be displayed confirming the file was saved.



## **Converting Waypoints to Lines or Polygons**

The [Using DNR Garmin to Convert Waypoints to Lines or Polygons](#) section earlier in this document detailed a couple of methods to accomplish this task. Heads-up digitizing is still a valid method in ArcMap. The "Convert Points" tool, however, is not available in ArcMap since it is a tool in the ArcView extension.

An alternative method is available with the standalone DNR Garmin. It requires that you have a list of waypoints in the DNR Garmin Data Table. The order of the waypoints in the table is important since it determines how the lines or polygons are drawn. Once you have waypoints in the table and in the correct order, simply select the "Track" option just above the table.



The waypoint records are converted to track records. You then can follow the procedures below in the [Working with Track Data Using Standalone DNR Garmin](#) section to save these points to a line or polygon shapefile.

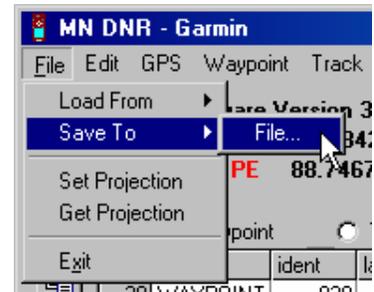
## Working with Track Data Using Standalone DNR Garmin

The procedures for working with the track data are basically the same as those given earlier in [Working with Track Data Using DNR Garmin](#) on page 28. The main difference pertains to saving the tracks . This is detailed below.

### Saving the Tracks as an ArcView shapefile

After editing the track data, you can then save the data as a new ArcView shapefile (point, line or polygon) or append to an existing one. Note: If no rows are selected, all the data will be saved. If some rows are selected, only that data will be saved.

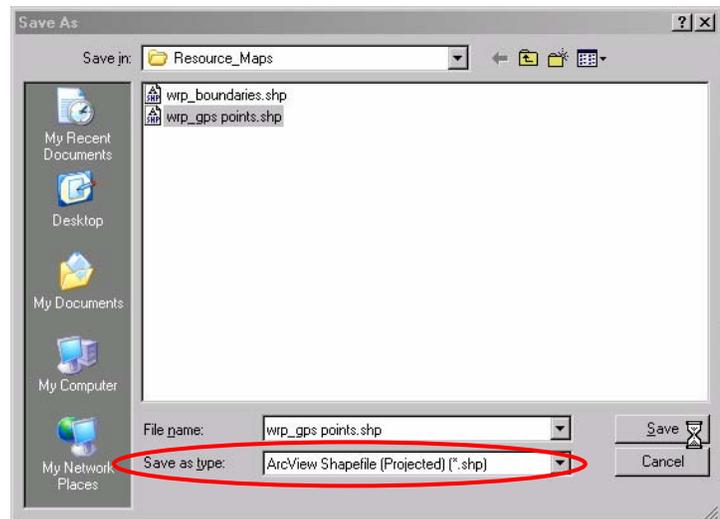
1. Select **File -> Save To -> File...**



2. For "Save as type:", select **ArcView Shapefile (Projected) (\*.shp)**.  
Navigate to the desired drive and folder.

Toolkit users: This would be  
C:\Customer\_Files\_Toolkit\  
*customer's name*\  
Resource\_Maps

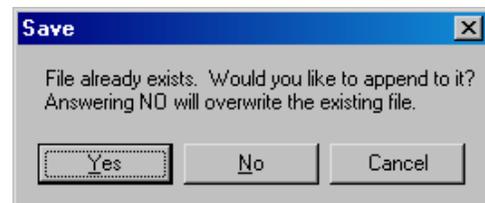
To create a new shapefile, give it a descriptive **File Name** and click **[Save]**. To append or overwrite an existing shapefile, select it and click **[Save]**



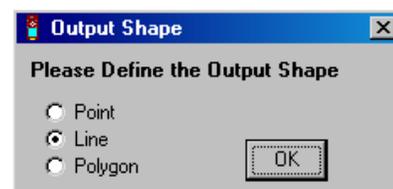
3. If an existing file was chosen, you will be asked about appending to it.

Answer

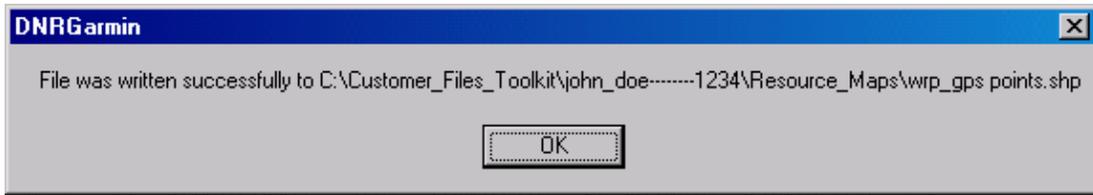
**Yes** to append to the file,  
**No** to overwrite the file, or  
**Cancel** to abort the save.



4. Select the output type for the data.  
Click **[OK]**.



5. A message should then be displayed confirming the file was saved.



## Adding a Shapefile to ArcMap

After a shapefile has been created from either waypoint data or track data, you will need to manually add it as a layer in ArcMap.

1. You should load ArcMap if it is not currently loaded.

### Toolkit users:

This is normally done by checking in the customer file, opening the customer's map document, and adding their plan using the Cyber Farmer button .

### Non-Toolkit users:

From the Start button, select All Programs

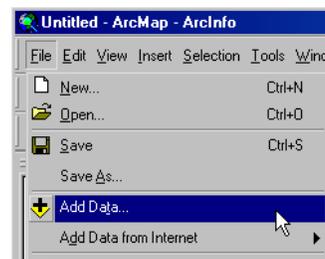
-> **ArcGIS -> ArcMap**

to start the program.

Start a new map or open an existing one.



2. Click on the "Add Data" icon or select **File -> Add Data...** to add the shapefile as a new layer.

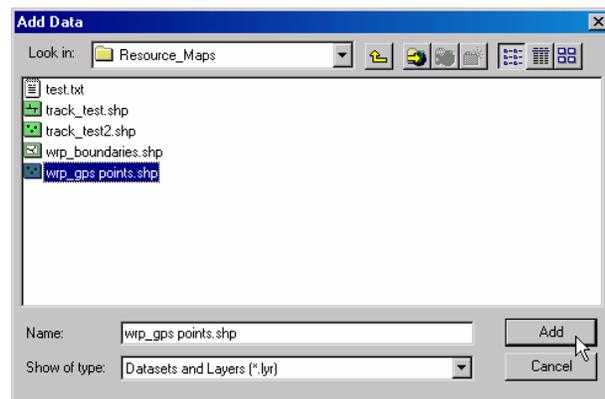


3. Navigate to drive and folder containing the desired shapefile.

Toolkit users: This would be *C:\Customer\_Files\_Toolkit\customer's name\*

*Resource\_Maps*

Select it and click **[Add]**.

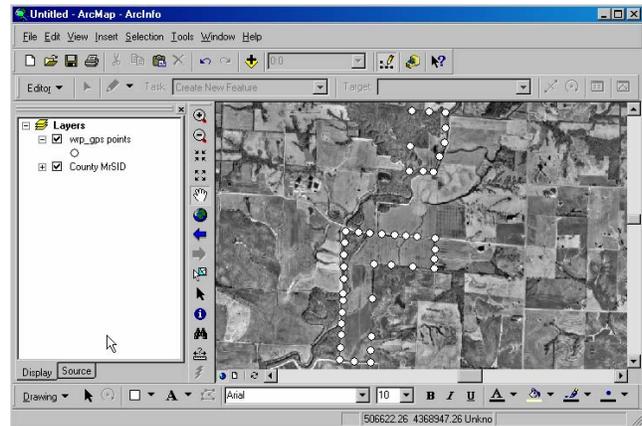


## Technology Technical Note MO-1

- The following window may appear indicating that no projection information (i.e., .prj file) could be found. Just click **[OK]**.



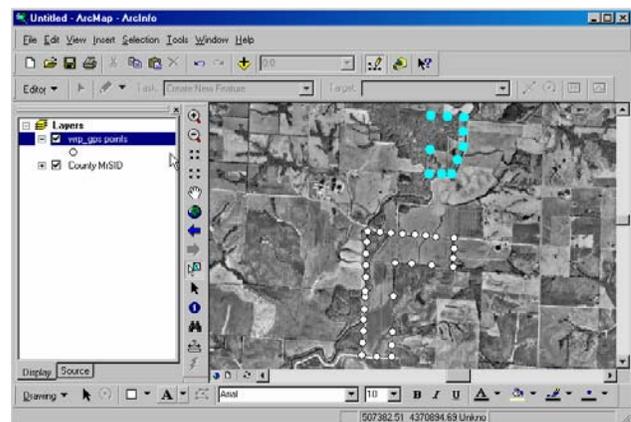
- The shapefile should then appear as a new layer in the left window and the points shown in the view on the right.



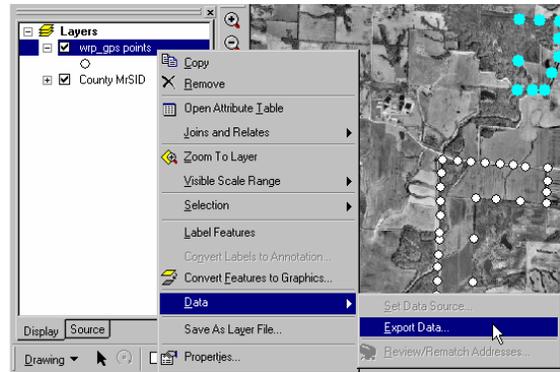
### ***Saving a Shapefile from ArcMap***

If you have some features (i.e., points, lines, polygons) in an ArcMap layer that you wish to upload to the Garmin GPS receiver, you can save them to a shapefile which can be loaded into DNR Garmin and then uploaded into the receiver.

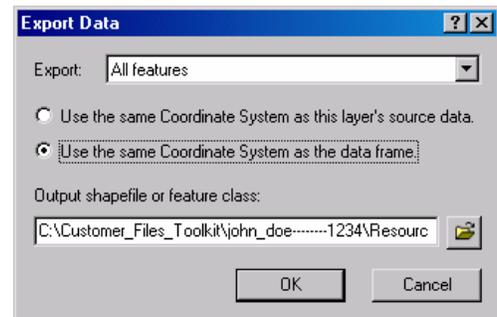
- With a map loaded in ArcMap, select the desired features in a layer that you wish to upload.  
If you want all the features in the layer, you can leave everything unselected.



2. Right-click on the layer name and select **Data -> Export Data...**



3. Choose either "Selected features" or "All features". Select "Use the same Coordinate System as the data frame". Enter the desired filename for your shapefile.



4. Answer the prompt for adding the exported data as a layer. This will most usually be "No", since you already have the layer and the real goal is to create a shapefile for DNR Garmin.



The shapefile that is created can now be loaded into DNR Garmin and then uploaded to the Garmin GPS receiver.

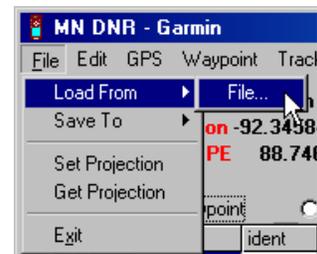
## Uploading ArcMap Data to the GPS Using DNR Garmin

DNR Garmin has the capability to upload position data from ArcView shapefiles to the Garmin GPS receiver. This allows you to store positions of features obtained or developed via ArcMap in the GPS unit. These stored positions can then be used in locating those features in the field (see [Navigating with the Garmin GPSmap 76](#) on page 34)

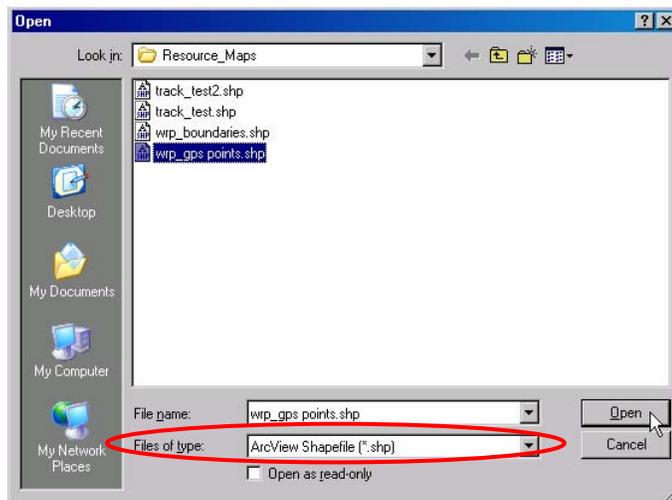
### Uploading Waypoints & Tracks

Waypoints (or tracks) can be loaded into the GPS receiver from point (or line and polygon) shapefiles.

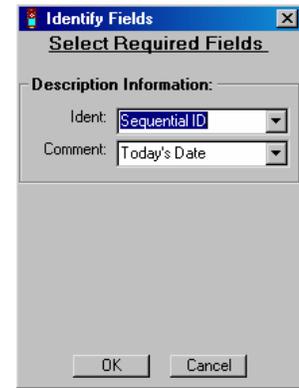
1. Click on **File -> Load From -> File...** to begin uploading waypoint (or track) data into the DNR Garmin data table.



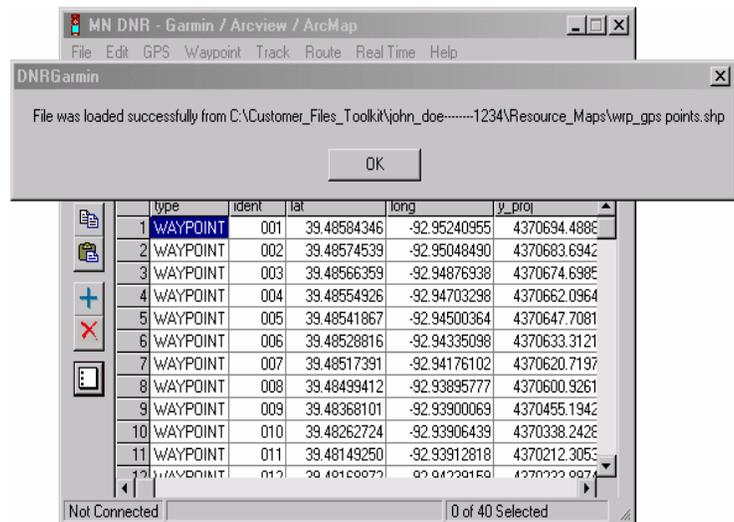
2. For "Files of type:", select **ArcView Shapefile (\*.shp)**. Navigate to the drive and folder with the shapefile. Toolkit users: This would be *C:\Customer\_Files\_Toolkit\customer's name\Resource\_Maps*. Select it, and click **[Open]**.



- If the point shape attribute table does not have an *IDENT* or *COMMENT* field or the line/polygon shape attribute table does not have an *IDENT* field, DNR Garmin will open a dialog box asking what values from the shape attribute table you want to use for these fields. For waypoints, The *IDENT* field will be loaded into the GPS as the Waypoint number. Selecting "Sequential ID" will number each point sequentially starting at 1. Select the desired choices for each field and click **[OK]**. Clicking **[Cancel]** will abort the load.



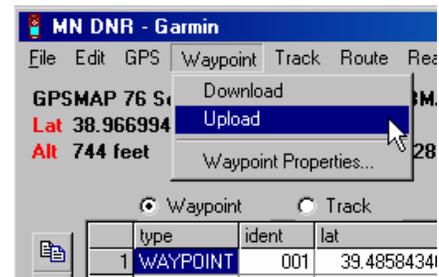
- The points (or tracks) should then be loaded into the DNR Garmin data table and a message displayed about a successful load. Click **[OK]**.



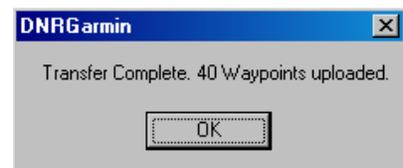
The waypoint (or track) data can then be edited before uploading if desired.

**A word of caution!** The program will overwrite any waypoints on the GPS unit that have the same *ident* as a waypoint being uploaded.

- Upload the waypoints (or tracks) in the table to the GPS by selecting **Waypoint -> Upload** (or **Track -> Upload**) from the DNR Garmin menu. NOTE: If any rows are selected in the table, only those points will be uploaded.



- A message box will appear once the download has been completed. Press the **[OK]** button.



The data has been loaded to the GPS and is ready to go to the field. For tracks, the data will load to the GPS as part of the internal track log. It will not show up as a saved track. The "bread crumb" trail will show, however, on the map page of the receiver.